FOOD MANUFACTURE

PUBLISHED BY THE LEONARD HILL TECHNICAL GROUP DECEMBER 1, 1959

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Today almost every food manufacturer, including bakers and confectioners, uses gas heat; and recent developments of new gas burners and ovens offer increased outputs at reduced fuel costs. Gas Industry research, together with the consumer service offered by the Area Gas Boards, ensures that tomorrow gas will be even more the preferred heat source in the food industry . . .
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Just 6D worth of VANILLIN MONSANTO

flavours 1 CWT. of chocolate!

Because of its high degree of concentration, only minute quantities of Vanillin Monsanto are required to give the desired vanilla flavour.

This economy in use plus vanilla's enormous popularity as a flavouring are reasons why Vanillin Monsanto is in great demand by food and confectionery manufacturers the world over. It enriches chocolate, confectionery, custard powder, ice cream, biscuits and other foodstuffs.

Vanillin Monsanto is available in crystal, needle crystal or powder form.

ETHAVAN (Monsanto's Ethyl Vanillin) is a more concentrated flavour, about 3 times as strong as Vanillin, and is found very useful in certain applications.

Send now for free Vanillin leaflet! Titled *Vanillin Monsanto*, this booklet gives you details of methods of use and recommended concentrations, as well as valuable technical information.

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Light-Sensitive Cells

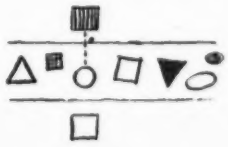
What are light-sensitive cells? They are devices which can sense and measure changes in the level of light or, in some cases, respond to the quality of light falling on them. There are various types of cell and each has its particular field of use. One of the best known is the photo-electric cell.

What can light-sensitive cells do? A change in the amount of light falling on the cell can cause a switch, relay or counter to operate. Alternatively, the direct indication of the light intensity can often allow some other factor to be determined and, if required, controlled. They are reliable and require little maintenance. Careful installation, as with all types of equipment, gives a good reward.

How can they be used? These cells have many applications in industry, for controlling processes, for inspection and measurement, for sorting material and for safety purposes:

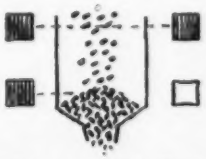
Counting

Where objects on a conveyor belt are too soft or light to operate a direct mechanical counting device, where they are too delicate or freshly painted to sustain physical contact or where the articles vary in size, a light-sensitive cell can be used. This counts the objects by interruption of an appropriately sited beam of light.



Hopper or Tank Level Control

Many forms of feed can be accurately controlled by light cells. One important one is for controlling the input to a hopper of fluid solids such as sand or peas. Here, two horizontal light beams are required: the upper, when interrupted, indicates that the hopper is full and stops the supply; the lower, when it ceases to be interrupted, indicates that the hopper is nearly empty and restarts the flow.



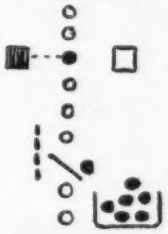
Package Content

The level of powder in packages can be checked with light cells. The cell is so positioned that when the

powder is up to the required level, the light reflected from the surface of the powder is picked up by the cell and causes the carton to be accepted. If not, it is rejected.

Colour Sorting

The quality of many articles can be gauged by their colour—seeds and nut kernels, for instance. The objects are fed into a tube by means of a vibrator pan and fall into the beams of three equally spaced light cells which scan them from all sides. If the object is acceptable it falls into a chute carrying it to one conveyor; if its colour is bad it is deflected as a reject.

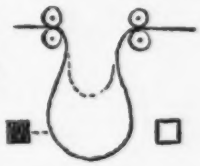


Guillotine Guard

Light cells for guarding a guillotine or power press should be used only as a supplement to a mechanical guard or where the latter is impracticable. The interruption of a curtain of light by a hand stops the machine instantaneously.

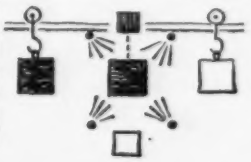
Press Feeding

Where the rate of feed of strip metal must be suited to a varying speed of acceptance by a press, a loop of the strip is allowed to sag between the feed and the press. When the loop reaches a predetermined depth a light beam is interrupted and the slack is taken up.



Processing Objects on the Move

Many articles are processed while on a conveyor line. For instance, where articles are to be sprayed while on the conveyor, the paint saved by stopping the gun between articles will make the device worthwhile. The same principle applies in a bakery to the spraying of baking tins with fat.



Automatic Door Opening and Closing

Doors can be caused to open or close by the interruption of a beam of light. This has its uses in such cases as control of doors on a heating oven or for the passage of vehicles in a factory. This is effected by a light beam on the side from which the approach is made (in many cases, both). When the approach beam is interrupted it opens the door which closes again after a given time interval.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association.

An excellent series of reference books are available (8/6 or 9/- post free) on electricity and productivity — "Higher Productivity" is an example. E.D.A. also have available on free loan a series of films on the industrial uses of electricity. Ask for a catalogue.

Issued by the Electrical Development Association
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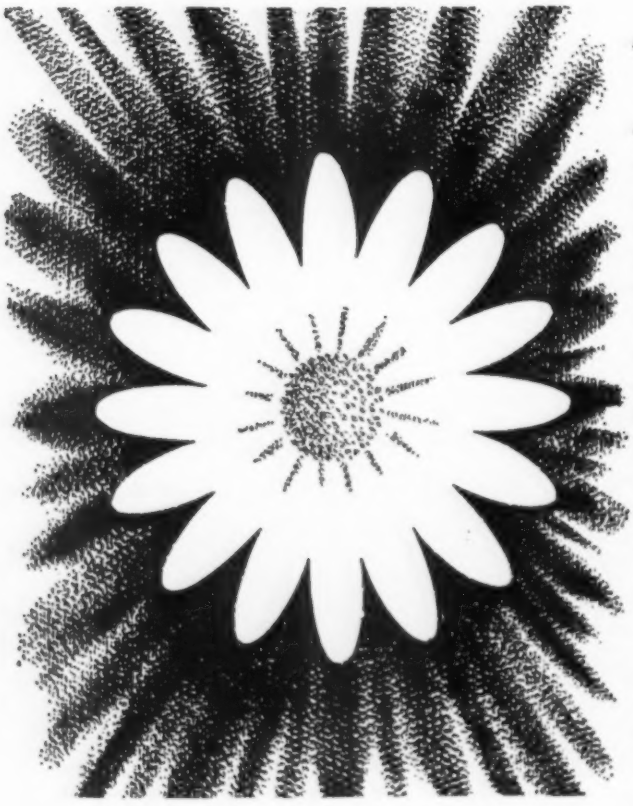

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'Embanox' brand butylated hydroxyanisole is easily soluble in essential and citrus oils at room temperature and may be incorporated simply by direct addition.

The recently introduced U.K. Antioxidant in Food Regulations 1958 include permission to use butylated hydroxyanisole in essential oils. Detailed information is available on request.

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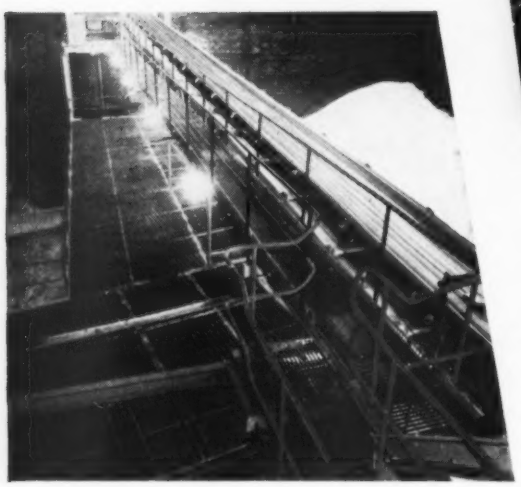
Safe foothold is assured in Tate & Lyle's Liverpool refinery by GRILL FLOOR flooring. Its open, non-slip surface sheds liquids, is easily cleaned and does not harbour dirt. On the stairways GRILL FLOOR stair treads and handrailing provide a sure footing.



GRILL FLOOR stair treads at Tate & Lyle's Liverpool refinery.

Tate & Lyle's Liverpool refinery, flooring and handrailing by GRILL FLOORS

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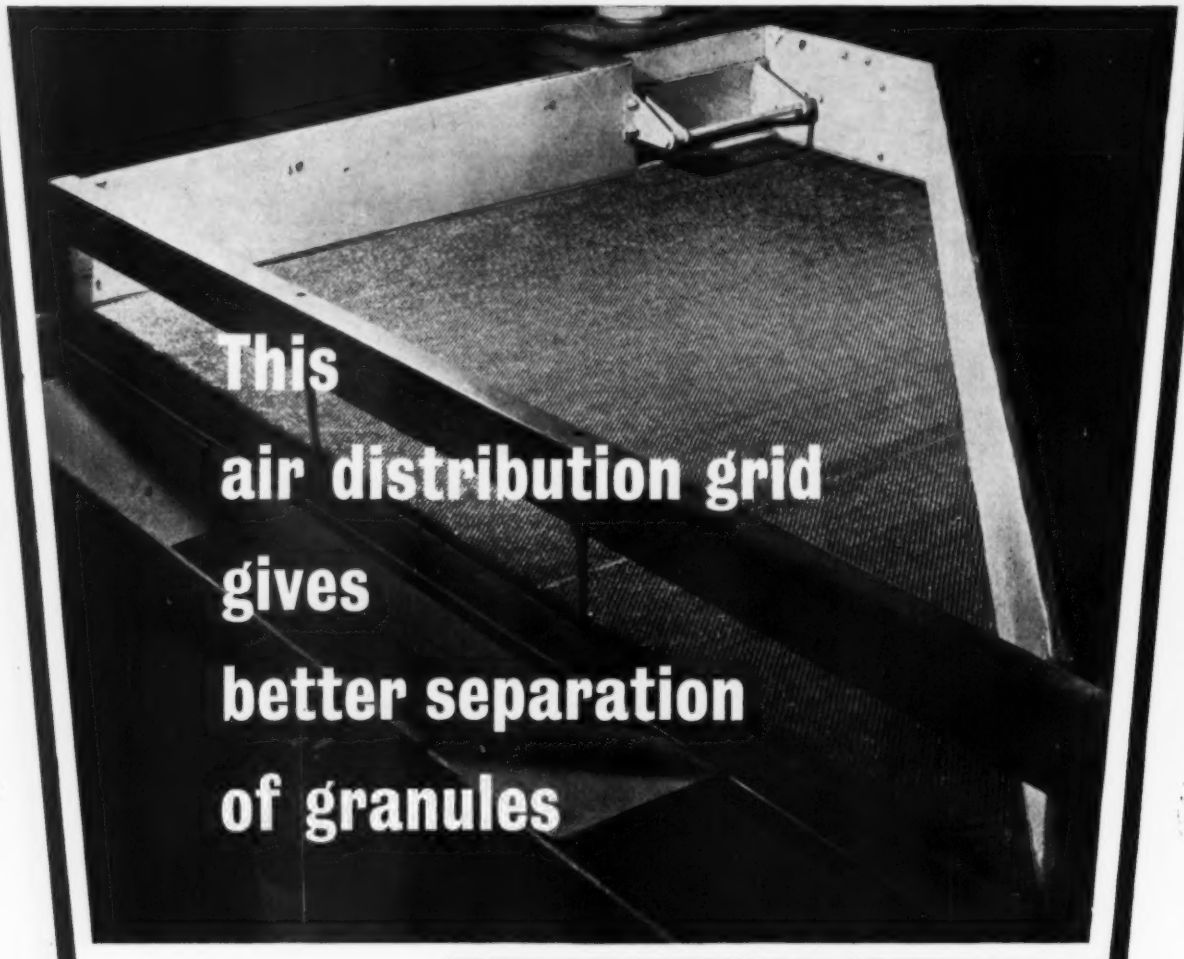

This air distribution grid gives better separation of granules

The VIBRAGEM Densimetric SEPARATOR

HS349

On the new Vibragem Densimetric Separator a close-mesh wire grid has been placed between the filtered air supply and the work screen on which the stock is graded. It's there for a vital function - to ensure the uniform distribution of air that is essential to really efficient separation. The result is a near-perfect separation of all granular products of closely-related specific gravity, permitting simultaneous classification, grading, removal of stones, and purification.

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2	selected soft wheat	7	all flower seeds
3	selected maize hybrids	8	wheat germ and bran
4	malted and un-malted barley	9	maize germ
5	all farm and field seeds	10	cocoa shells

These materials can also be treated: almonds, beans, peanuts, ceramic materials, chicory, wood-shavings, clover, coffee, cork, flax, hemp seed, lentils, oleaginous seeds, peas, raisins, rice, salt, sand, sawdust, etc.

Examples of capacity: Vegetable seed mixtures can be separated and classified at 800 lb. an hour, and hard wheat and barley mixtures up to 3,300 lb. an hour. Let us test and report on your own products in our experimental laboratories. Send for details today.

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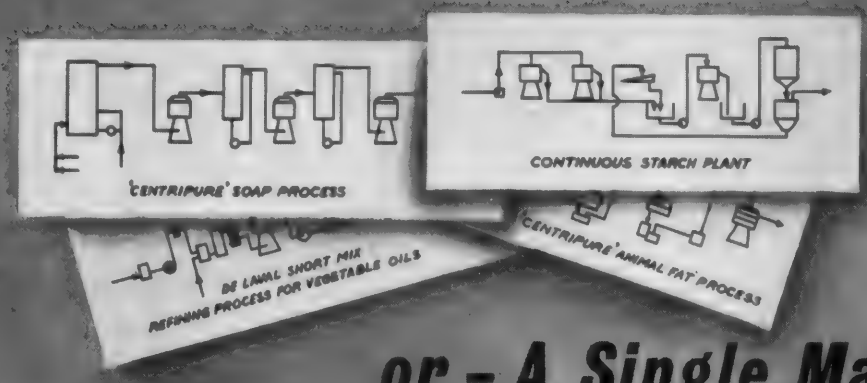
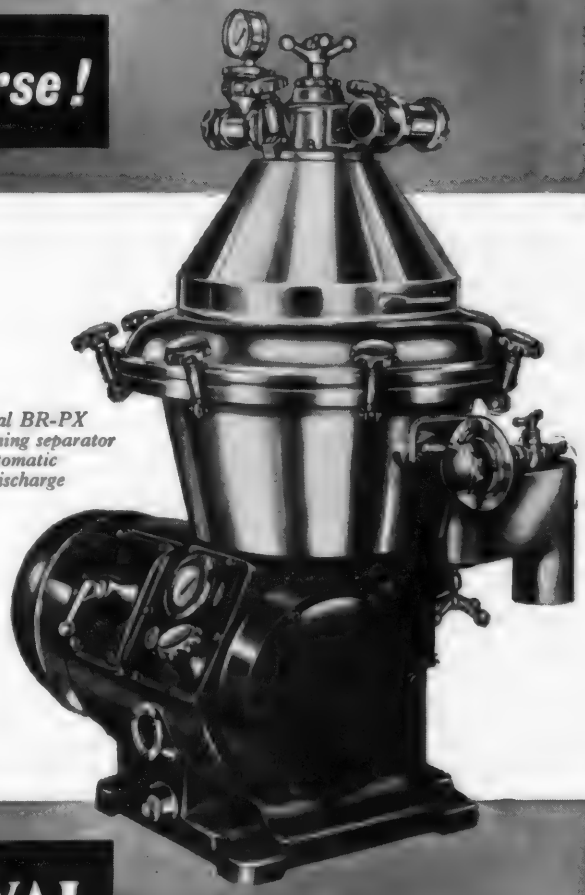
A Complete Continuous Process



or – A Single Machine

DE LAVAL *of course!*



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We're turning out some lovely lard...

Sharples Low Temperature Rendering Process produces high quality, low-cost fats

RENDERING animal fats by the old methods is very unsatisfactory because they need a high temperature and heat can cause degradation of both the fat and the protein.

We at Sharples have spent 5 years of research and testing on this problem. The result is the Sharples Low Temperature Rendering Process which gives a premium grade fat and protein and makes big savings in operation.

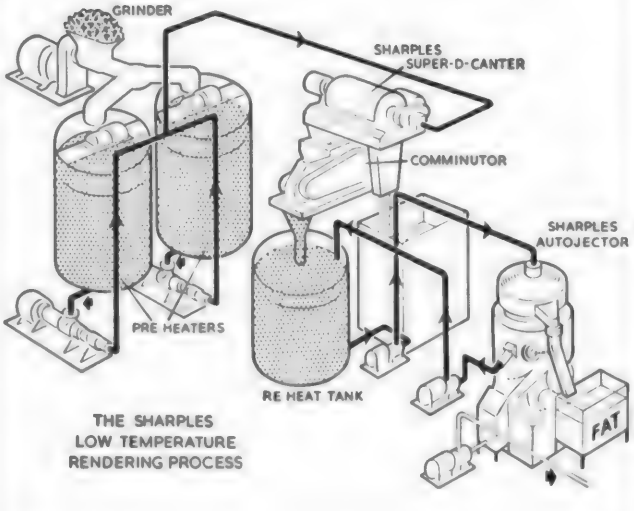
The secret is to break down the fat cells mechanically so that far less heat has to be applied to the raw fat. After grinding, the fat is heated to a moderate temperature for a short holding time to reduce viscosity and is then treated in two stages to produce a premium grade fat and a quality protein.

The Sharples Process gives an outstandingly better coloured, higher grade fat and protein which is usable for pet food or for human consumption. We confidently expect that the Sharples Process will revolutionise the economics of the animal fats industry.

This Sharples process is only one example of creative foodstuffs engineering by the Sharples organisation.

Whether it's a matter of a complete process or a single machine every plant user can avail himself of the expert advice provided by Sharples. This is backed by extensive research facilities and full size development plants.

If you have a processing problem you are invited to write to the address below or 'phone Camberley 2601 and talk to Francis Hooley about your problem. Send for Bulletin No. 1256F.



THE SHARPLES LOW TEMPERATURE RENDERING PROCESS

SHARPLES

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Why not write to your local factory address below to learn all about the special service we can give you.

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AINTREE Wareing Road, Aintree Trading Estate, Liverpool, 9. (*Aintree 7554*)

BLACKWOOD Bloomfield Road, Blackwood, Mon. (*Blackwood 2277*)

BURNLEY Cog Lane, Accrington Road, Burnley, Lancs. (*Burnley 2538*)

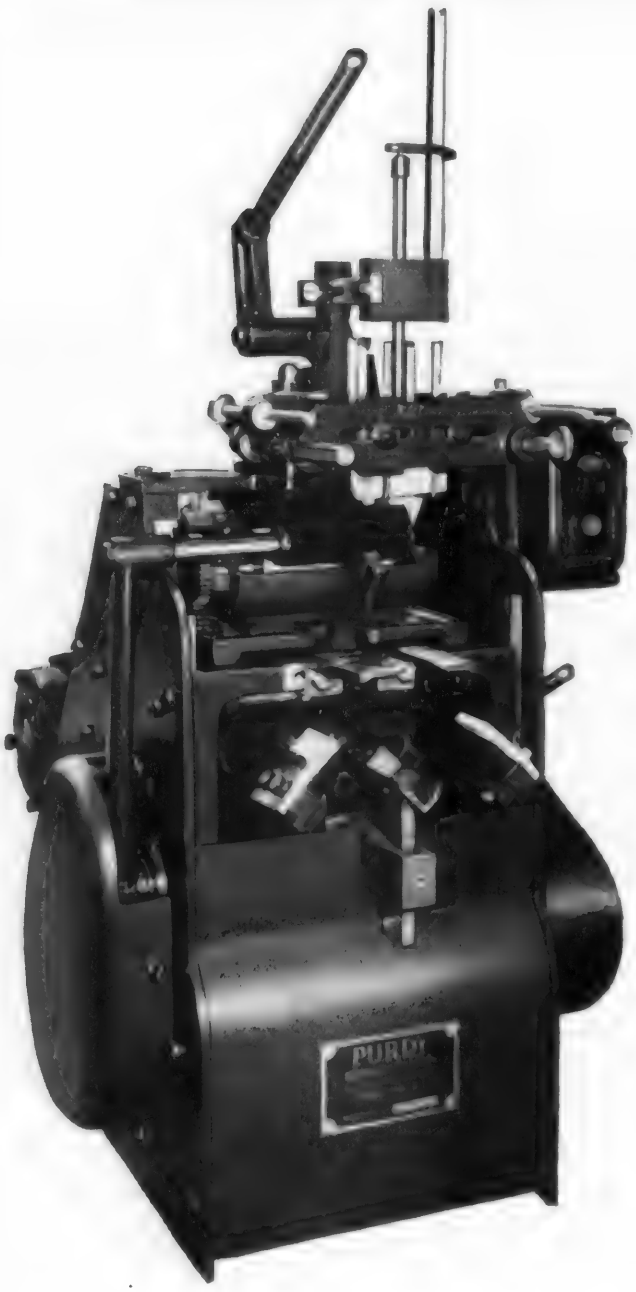
DAGENHAM Freshwater Road, Dagenham, Essex (*Seven Kings 7712*)

LEEDS Dewsbury Road, Leeds, Yorkshire. (*75241 & 77128*)

LONGTON 482 Uttoxeter Road, Longton, Staffs. (*Longton 33328*)

PORTSMOUTH Rodney Road, Fratton Industrial Estate, Fratton, Portsmouth, Hants. (*Portsmouth 32373*)

SUNDERLAND Pallion Trading Estate, Sunderland, Co. Durham. (*Sunderland 57760*)



THE PURDY "BANTAM" BENCH LABELLER

●

or the semi-automatic bench labeller with all the virtues! for by means of the various accessories available, this machine can be made to label round, flattish, square or oval shapes, even with two different shaped labels at one and the same time. It is fitted with an independent drive $\frac{1}{8}$ h.p. motor with normal push button starter and female operators love it because they can sit whilst working.

Leaflet No. BFI/BLI.

If the articles to be labelled are fed to the operator by conveyor with conveyor take away it is, with normal type applications, well within the operators' ability to deal with up to 60 containers a minute. Intricate shapes tend to reduce output in proportion. It will handle labels up to $3\frac{1}{2}$" wide by 3" high. These limits can sometimes be slightly exceeded, it will—*Oh well, perhaps it would be easier if you send for the other details, space is so limited here!*

PURDY MACHINERY CO. LTD

41-42 PRESCOT STREET LONDON E.1

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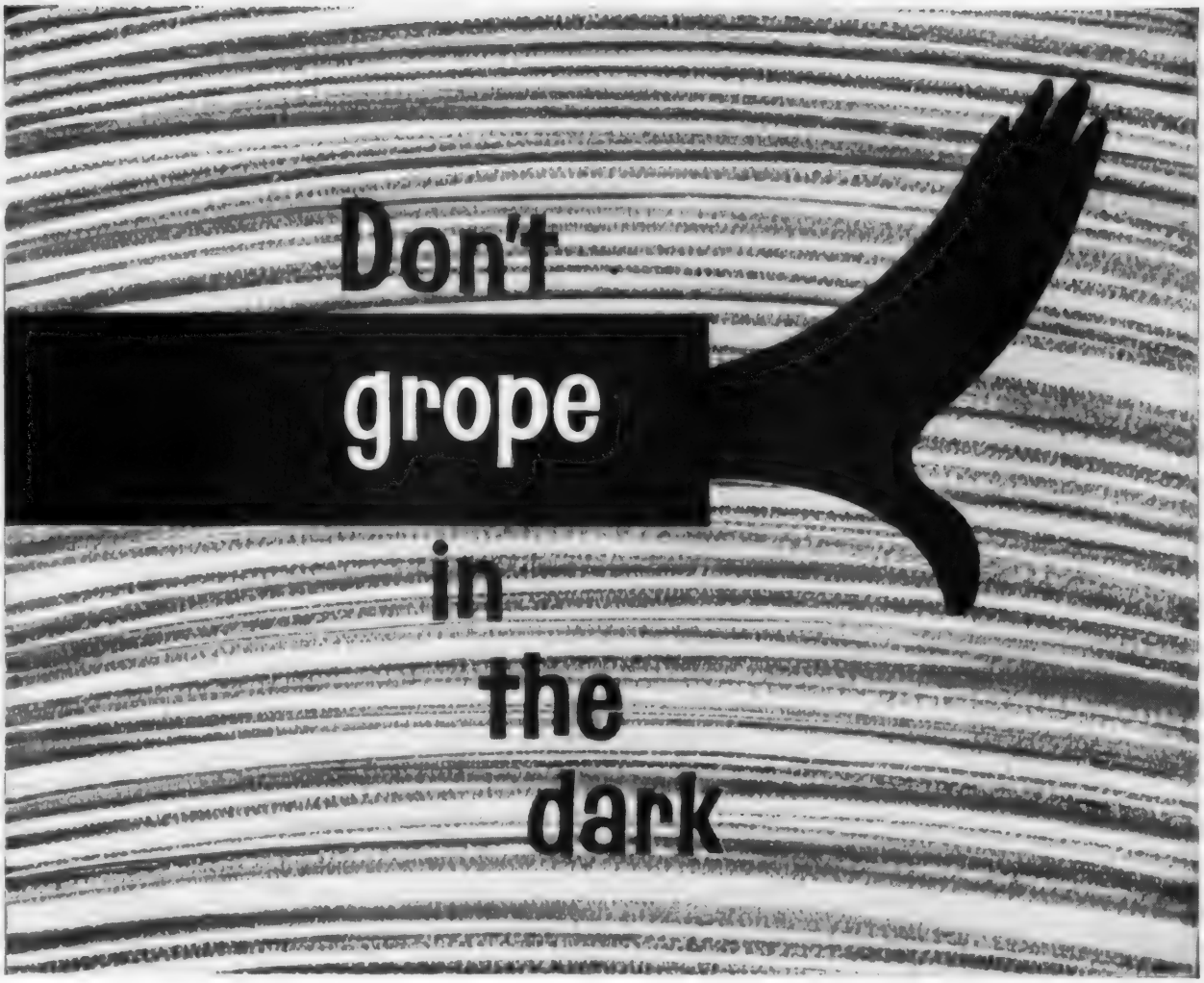

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. . . aided by many years of experience in the field of Food Technology, exists to help YOU. Our staff will prepare a recipe for you or co-operate with you to solve a problem of one of your own recipes. At all times, the assistance of our staff is available without cost or obligation. Most important of all the service is CONFIDENTIAL.

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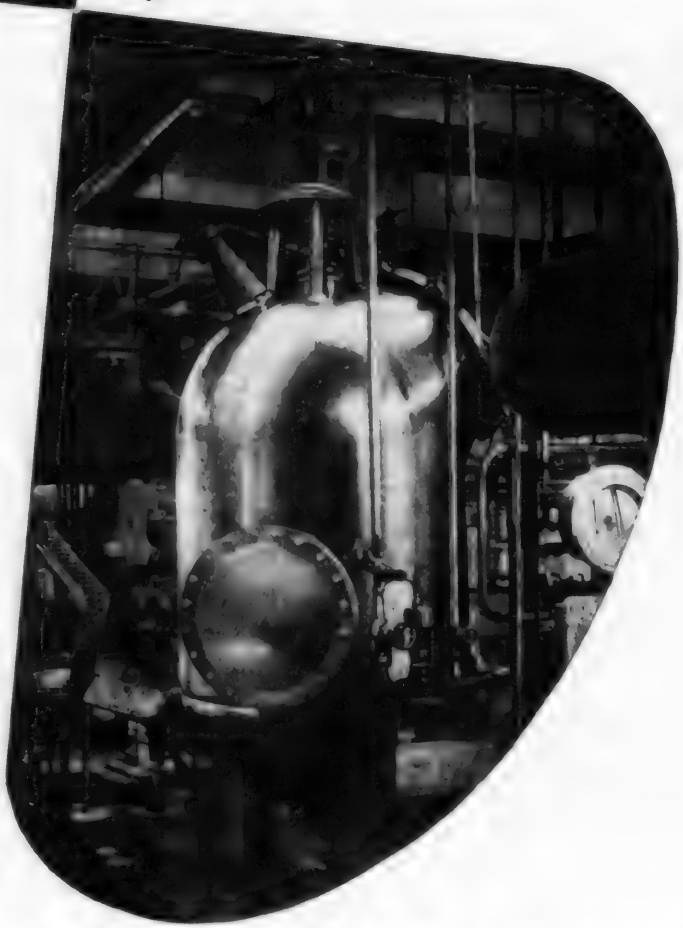

For whatever purpose plant is required, we can design, manufacture and install it. Our qualified engineers are ready to help you with your particular problems and will submit their suggestions and ideas quickly and expertly. May we have your enquiries?

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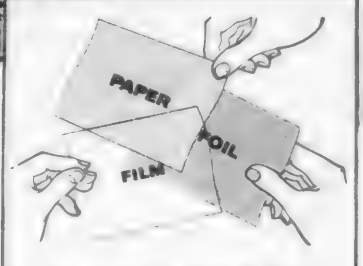
New packaging materials are increasing the scope of laminations: at the Metal Box research laboratories investigations are made to ascertain their suitability—the compatibility with the product, safe shelf life under a wide range of conditions, capabilities on high-speed forming and filling equipment—these points can be assured for your product by Metal Box before a final decision to use a lamination is made.

If you have in mind a free sampling campaign, market trials, nation-wide or even world-wide scheme for unit packs let Metal Box prepare a lamination which will *maintain the quality of your product.*



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Versatility

BEER IN CANS... another new use for tinplate

Tinplate is changing the traditionally conservative habits of beer-drinkers. Already in Britain leading brewers are packing no fewer than one hundred and eighteen brands of beer in cans.

Research and development by The Steel Company of Wales have helped to make possible this further example of tinplate's increasing versatility. In addition to the special type of tinplate required for canning beer, The Steel Company of Wales produces a wide variety of grades and qualities to suit many specialized applications.

Satisfying more than three-quarters of Britain's needs has taught us a great deal about tinplate. Why not write to us? There are several interesting recent developments.

TINPLATE DIVISION
THE STEEL COMPANY OF WALES LIMITED

Carmarthen Road, Swansea, Glamorgan Telephone : Swansea 51571 Telegrams : Welshplate, Swansea

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use Rayner's
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it can be done

Sand castings in Hiduminium can and do combine density of structure with the kind of close-tolerance working which reduces subsequent operations to a minimum. H.D.A. make sand castings to this standard in low, medium and high strength alloys. Complexity of design is welcome.

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. . . works wonders with your sales!

And so it should! For this service has been designed to increase your sales. A complete packaging service producing glass containers, with the product, the closure and the outer in mind. First class containers backed up by a first class service evolving new ideas for you and your products. If bottling or packing is your business here is a name worth remembering.

Jackson packaging advisory service
A comprehensive service embracing design and advice not only on glass containers but also on closures, display boxes and outers, ring Museum 7263 with any problem you may have.

Jackson research unit
A team of experts, perfecting new types of glass packs and closures. If you have a new product or want to give a new look to an existing one, we may already have the answer for you.

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Phone: GERrard 8611. *Grams:* Korkanseal, Lesquare, London.

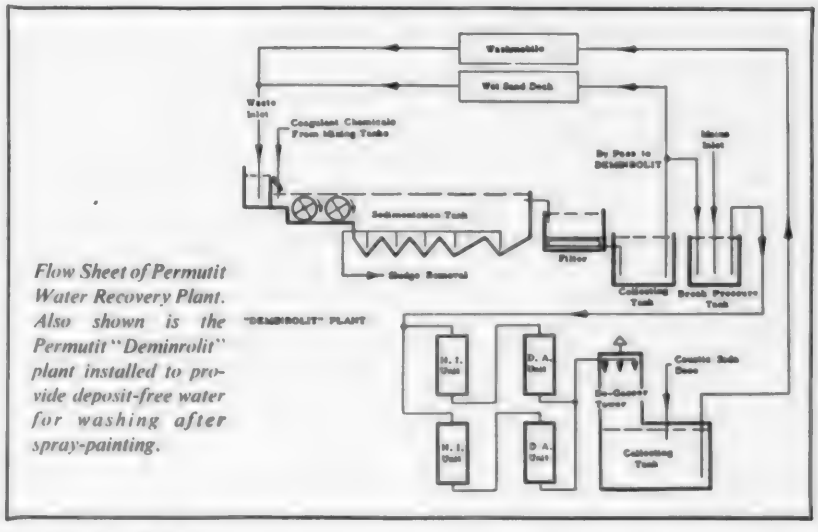
PERMUTIT
Water Treatment Plant

Water Recovery Plant Beats Water Shortage and Cuts Water Costs

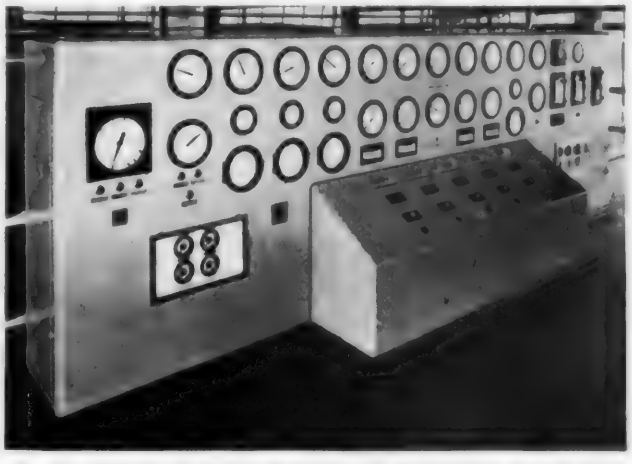
Here are examples of how different water recovery problems have been solved by the installation of Water Recovery Plant by Permutit. These plants combine classical water treatment practice with the latest techniques in plant control.

400,000 gallons of fouled water recovered daily from Ford's Paint Trim and Assembly building.

The possibility of restricted supply of mains water, coupled with an increase in water charges, made water recovery an essential for this factory. Permutit investigated, carried out extensive laboratory tests and put up a scheme which met Ford's requirements completely. The scheme allowed for the purification for re-use of 400,000 gallons of water daily. This water, mainly derived from the Wet Sand Decks and Washmobile departments is subjected to chemical treatment, sedimentation, flocculation and filtration, and employs Permutit plant specially designed for the job. A flow sheet of the plant is shown on the right.



Flow Sheet of Permutit Water Recovery Plant. Also shown is the Permutit "Deminrolit" plant installed to provide deposit-free water for washing after spray-painting.



Plant Control Panel at the Heinz Factory designed and constructed by Permutit.

Recovering 110,000 gallons of fouled water hourly at the new Heinz factory at Kitt Green.

In the process of cooling hot cans of food, the cooling water is fouled by burst cans. To conserve water, Permutit put forward a scheme which would enable the cooling water to be recovered, purified and recirculated. The plant is basically a gravity sand filtration type, but specially designed for this application and augmented by chemical dosing gear to make filtration more efficient and to provide for sterilization. Another feature of this plant is the automatically controlled filters.

These plants demonstrate Permutit's ability to deal with water treatment problems of every kind. Water shortages, disposal problems and water costs are but three reasons why the provision of water recovery plant is worth considering. If you have, or can foresee such problems contact Permutit now.

THE PERMUTIT COMPANY LIMITED

DEPT. W.L. 367, PERMUTIT HOUSE, GUNNERSBURY AVENUE, LONDON, W.4. TELEPHONE: CHISWICK 6431

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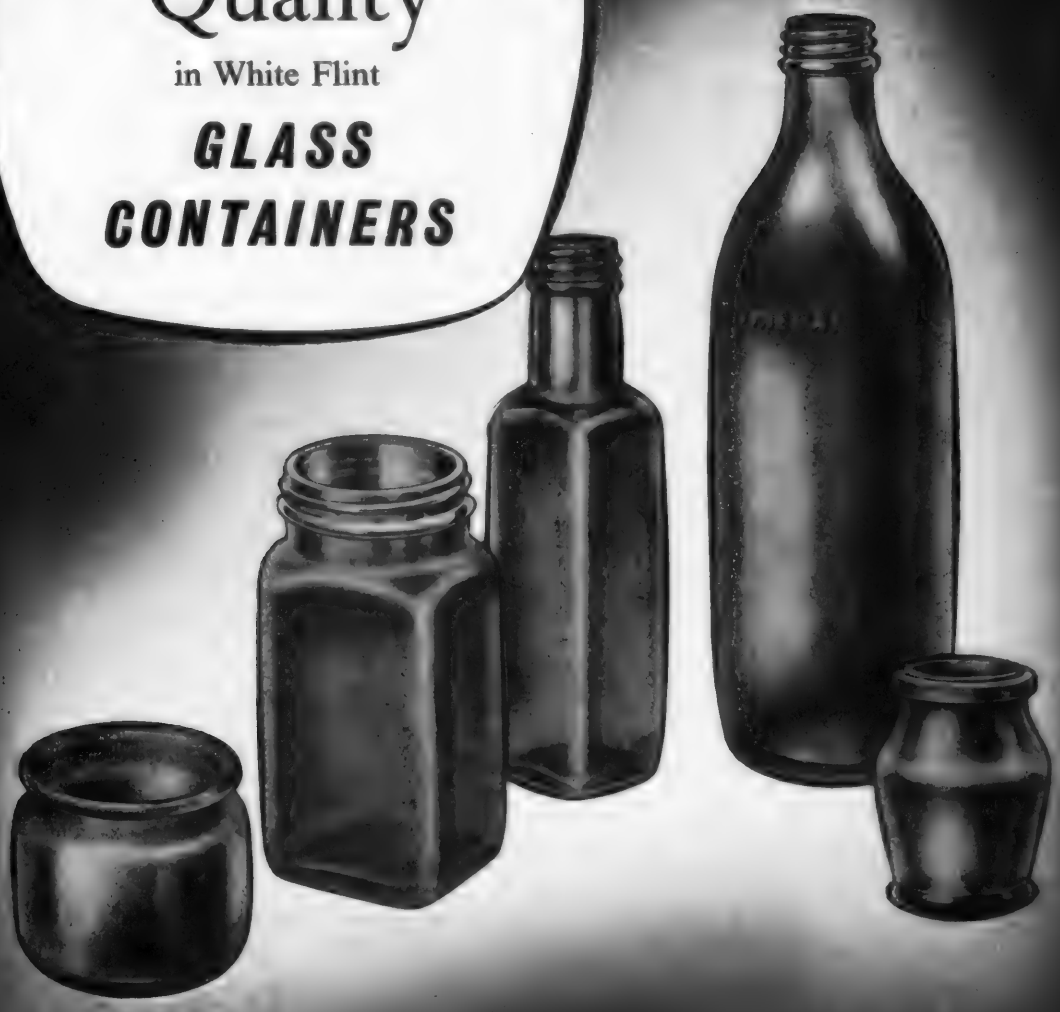

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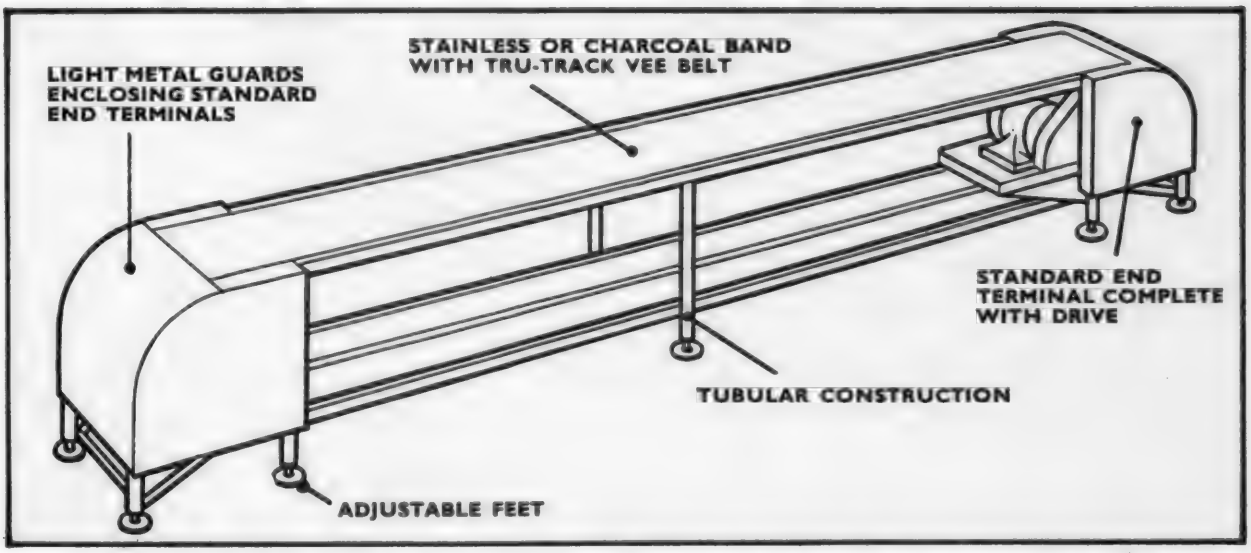
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STANDARD END TERMINAL COMPLETE WITH DRIVE
TUBULAR CONSTRUCTION
ADJUSTABLE FEET

with STANDARDISED TRU-TRACK CONVEYORS

This photograph shows a typical installation of a conveyor for preparing hams in a food factory

Sandvik Stainless Steel Band Conveyors have been specially designed to provide the most hygienic method of handling foodstuffs. They are supplied in band widths from 4 to 32 inches and have a hard smooth surface which has already proved its efficiency with many well-known manufacturers.

The Tru-Track feature ensures constant band tracking with minimum clearances of conveyor structure, which is built up of standard tubular sections to provide a perfect dust-free unit capable of being extended or shortened as desired. You will be surprised at the relatively low cost of these standardised conveyors, further details of which, complete with specification, will be supplied on application.

Sandvik **STEEL BAND CONVEYORS LTD.**

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Stepless speed variation over a 9 to 1 output speed range (1/3 to 3 times the input speed).

Constant horse-power transmitted throughout the speed range.

Flange mounted motors (when required) giving output speeds from 320 to 2880 r.p.m. and from 480 to 4320 r.p.m.

Output speeds down to 3 to 27 r.p.m. or lower can be obtained with flange mounted Reduction Gears.

Exceptionally light, sensitive and accurate control of speed settings by lever or handwheel with counter type indicator incorporated if required.

Co-axial input and output shafts which rotate in the same direction.

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Compactness, with consequent ease of mounting as an integral part of a machine.

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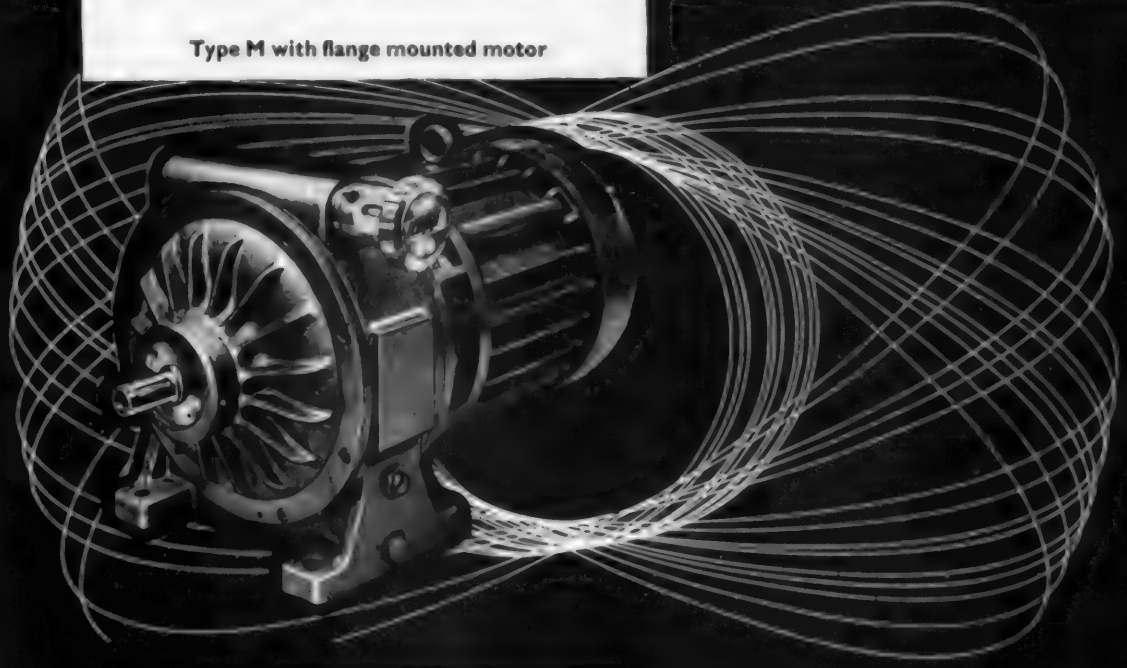
A GEARLESS GEARBOX

Type M with flange mounted motor



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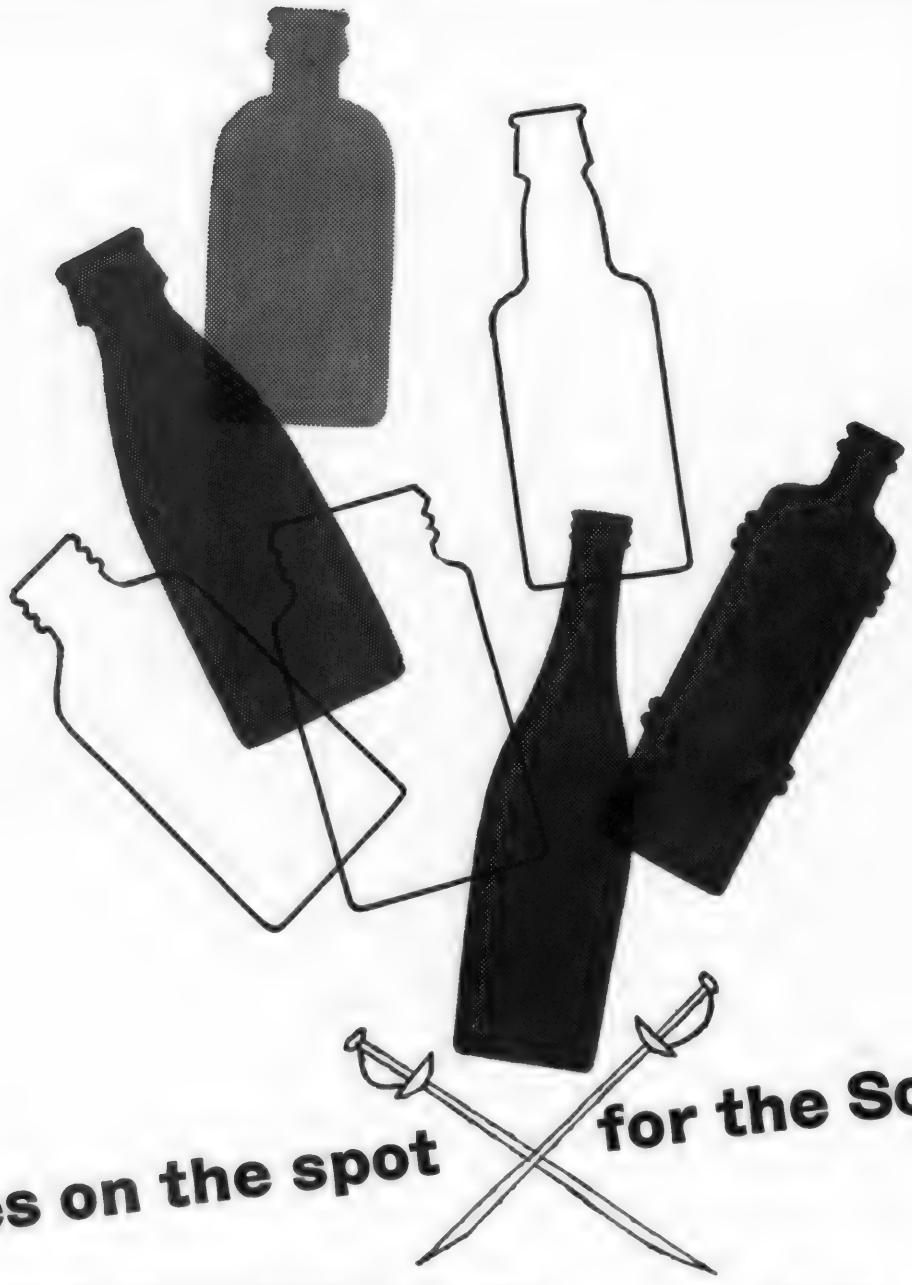

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Everything you need in glass packaging, right here in Scotland. That's what the Alloa Glass Work Company offers. You get first-class, individual treatment, the best in research and design, and the Alloa Company has an associated closure company in Scotland too. Isn't this the kind of service *you* want? Get in touch and it's yours!

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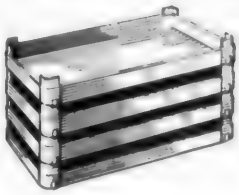
ALUMINIUM STACKING TRAYS



STACKING TRAY (Catalogue No. TB.27153)

As illustrated above, having dimensions of 26¾" × 14¾" × 2¼" made as pressings from 16g Light Alloy with special corner stacking features which have convex locating dimples for greater efficiency and giving ¾" air space when stacked. Alternative brackets giving greater or less air space can be fitted if required.

Also available with a depth of 1⅜" (TB.27151) and both depths can have perforated bases.

A very wide range of pressed trays with cut top edges, ½ rolled edges, or flanged edges can also be offered, write to . . .

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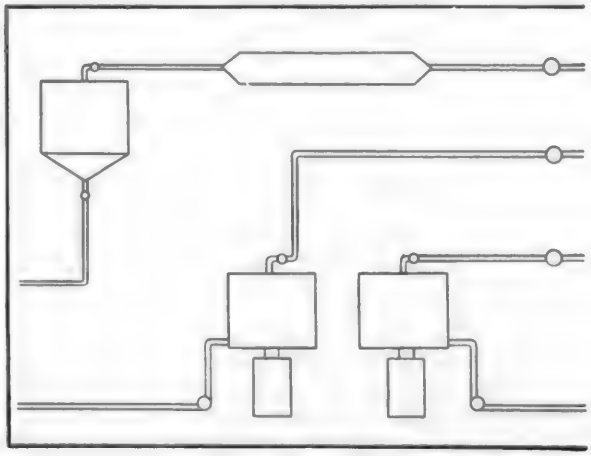
FIRST YOUR FORMULA. It was born in your laboratory out of hard thinking, patient work and hopeful spending. Now it is ready to be turned into productivity and profits. Now speed comes into the picture; speed and volume. It's going to be thousands of gallons now, not pipettes full. Yet it has all got to be as precise in the factory as it was in the laboratory. Clearly a matter of measured batch dispensing and blending; a problem of process control.

THE AGE OF AUTOMATION

This was the picture we at Measurement had in our mind's eye when we were working on the Measurement *Automatic* Liquid Process Control system. Industry, we knew, would want accuracy and speed, and a modern way of applying it. An up-to-the-minute way. In this modern age the bucket is out, mainly because it excludes accuracy. Lifting and trucking must be eliminated because firstly it results in hold-ups, secondly in a waste of labour, and thirdly fatigue with its resulting fall-off in rate of production. Our equipment aims at automatically dispensing the right quantity to the right place at the right time, with all the necessary indication and records made automatically en route. The age of automation inspires sound business men to ask for the right installation for the job and no making shift. Control is the keyword.

"Backed by our years of experience", as the advertisements say (for we have been making liquid meters, pumps and electrical control apparatus for a very long time), we set about meeting this challenge. Years of research finally produced



the instrumentation that offered the flexibility which is essential, and the standardisation which makes the system an economic proposition for industry.

A FLEXIBLE SYSTEM

Today Measurement equipment is used in handling a large number of liquids in food manufacture, paper making, oil blending and chemical mixing processes. Liquids handled range from condensed milk to caustic liquors, and from benzine to beef dripping, and at Measurement Limited there is a catch phrase, " If it flows in a pipeline, then we can meter it".

ADVISORY SERVICE

We offer advice, designs and drawings to cover any complete liquid handling installation to suit any process—*your* own particular process. Given dimensional details, components can be supplied to be fitted into existing panels; otherwise we would supply complete wall-mounted or bench-mounted panels, or console models, tested and ready for installation. Servicing is a thing we regard as a duty at Measurement.

PUNCHED CARD SYSTEM

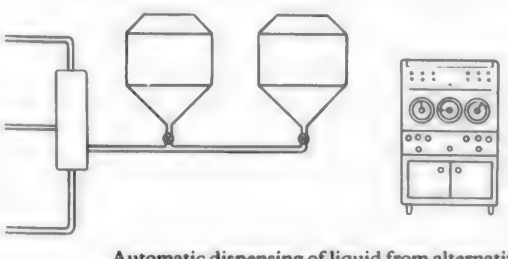
Not only does the Measurement system make Liquid Process Control merely a matter of pressing buttons, now batch delivery and blending can be completely preset and controlled by the punched card system!

SCRIBBANS-KEMP (BAKERIES) LIMITED
Control panel for automatic blending of liquids used in biscuit manufacture at the factory of Scribbans-Kemp (Bakeries) Limited, Grimsby.

FOR MEASUREMENT
LIMITED

A WIDE RANGE OF INSTRUMENTS

Whenever a liquid has to be handled, Measurement Limited make equipment to do the job, from indicating a total consumption of a liquid to the automatic dispensing, blending and mixing of various liquids.



Automatic dispensing of liquid from alternative storage tanks to a blending tank and to two rotary mixing machines. The three meters are denoted thus —○, and the three indicators are remotely mounted in a control panel with signal lamps to confirm operation of meters, valves and pumps.

The range of products include:—

(a) Meters made in various metals and moulded materials to enable almost any particle-free liquid to be metered.
(b) Meters with small pointer type indices.
(c) Meters with small direct reading counters.
(d) Meters with resettable direct reading numeral rollers.
(e) Meters with remote reading magnetic counters.
(f) Meters with horizontal or vertical large dial instruments having resettable pointers.
(g) Meters with automatic presettable indicators that enable the operation of valves, pumps and warning devices.
(h) Complete panels with auto preset indicators, signal lamps and push buttons for wall mounting or free standing.
(i) Schemes involving a number of meters dispensing liquids to one outlet.
(j) Schemes where a number of liquids are dispensed through one meter.
(k) Automatic actuation of metering equipment by photo-electric cell or contact operating devices.
(l) Complete panels incorporating mimic diagrams.
(m) Complete auto preset equipment that could be preset by a punched card reader unit.

★ *You may be tempted to tear out this advertisement for reference. Well, it's always a pity to spoil a book: get your Secretary to drop us a card and we'll gladly send you a reprint of these pages. A letter with more detailed requests will, of course, receive more detailed attention. Write to:—*

MEASUREMENT LIMITED

TAMESIDE WORKS DOBCROSS, NR. OLDHAM, LANCS.
Telephone: Delph 424 (5 lines) *Telegrams:* Supermeter Dobcross
MEASUREMENT ENGINEERING LIMITED P.O. Box 2305, Wellington C.I.
PARKINSON COWAN (S.A.) (Pty.) Ltd. P.O. Box 1113, Johannesburg
Export Enquiries to: Parkinson Cowan Group Exports Ltd., Terminal House, Grosvenor Gardens, London S.W.1.
Telephone: SLOANE 0111/4 *Cables:* DISC London

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Sound materials, workmanship & value

All garments are correctly made for the purpose from most reliable materials.

All overalls are made from cloth spun and woven in Lancashire, pre-shrunk, and guaranteed.

All seams and stitching are done in a thoroughly workmanlike way to 'hold together' and prevent dangerous break-aways.

Garments are well-cut to ensure comfortable fitting with easy movement. There is no skimping.

Particular care is given to the cut and make of women's overalls to give lasting smartness and continued satisfactory service.

Remploy have over the years supplied protective clothing for all purposes to many organisations, light and heavy industries, large and small. At all times the reliability of Remploy has been thoroughly appreciated. Tell Remploy your needs, and see how completely and economically your requirements will be satisfied.

BOILER SUITS · BRACE & BIB OVERALLS
LEATHER APRONS · SLEEVES & LEGGINGS
WAREHOUSE COATS · WOMEN'S WRAP-OVER OVERALLS

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Smart and durable. With two breast pockets; two side pockets in trousers; hip and rule pockets. All-round belt. Detachable buttons. All pockets bar tacked. In white, navy, khaki, tan, and bleached.

GLOVES for all purposes. Remploy have in stock a full range of standard gloves for all industries, and those are available in all sizes and fittings.

Light-weight general-purpose glove with butt split palm, fabric back, and knitted wrist. Men's and women's sizes.

Popular type Welder's Gauntlet, Butt split chrome. Double palm. 4" cuff.

WOMEN'S WRAP-OVER OVERALLS
Attractively styled. Breast and side patch pockets. Detachable buttons on cuffs. In white, green, and saxe.

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To: REMPLOY LIMITED,
Protective Clothing Sales Division,
Oxgate Lane, London, N.W.2.

Please send me details and Illustrated Literature regarding Remploy Protective Clothing.

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REIGATE SERVICE:—
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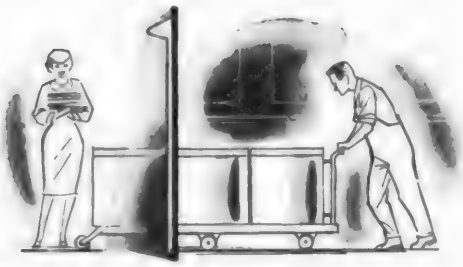
Samples and Prices available upon request.

the safe



Safe because it is translucent, hygienic, allows easy passage for speedy handling of goods between departments where constant usage is necessary.

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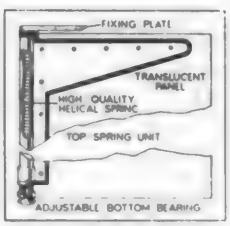
Flexible to allow wide manually operated trolleys to be used.

self-closing

door

Self-closing so that it cuts down draughts and noise.

The framework of the door consists of a vertical tube which fits close to the door frame. Concealed in the top of the tube is the patented double-action return spring, this is fully adjustable and ensures that the door is self-closing. The door pivots at the top and bottom on axles let into the lintel and into the floor.



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Translucent Doors

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See Neway Flexible Doors at the Building Centre, 26, Store St., London, W.C.1, or write for free leaflet to the Manufacturers.

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Boiler and mountings from Bootle

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Oil burner from Orpington

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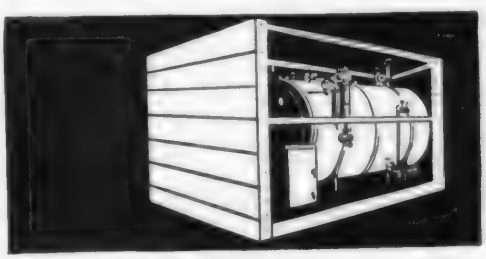
Oh Dear, I do hope it all works out

let's not take any chances, let's install a STEAMBLOC packaged boiler

A STEAMBLOC packaged boiler is in every way the most economic means to profitable steam raising. It also offers this important advantage . . . every STEAMBLOC boiler is fully automatic and supplied as a *complete* unit. Burner, feed pump, oil pump, oil heater, fan, control gear . . . *all ancillaries are supplied with the unit*, which is steamed and tested before despatch. Average efficiency exceeds 82.5% over modulating range. Steambloc boilers are available with capacities up to 25,000 lb/hr: write NOW for further details and a copy of Publication No. 1628/4.

A product of the Babcock & Wilcox organisation



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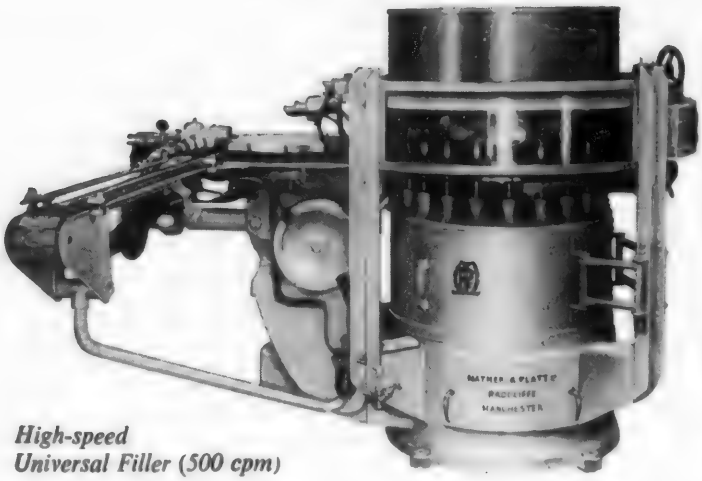
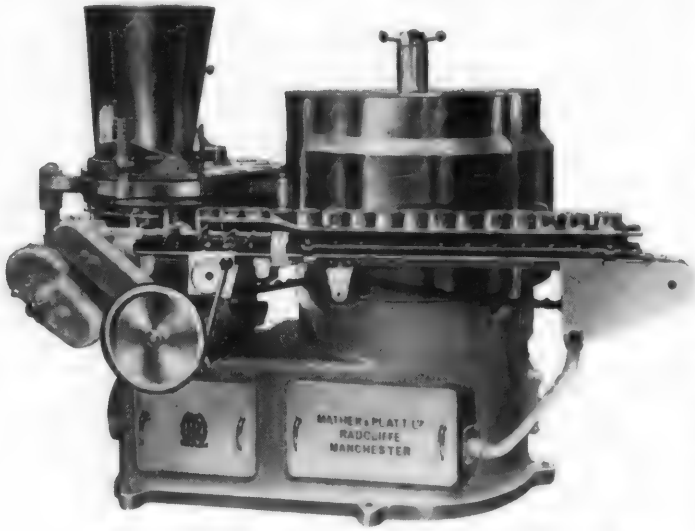
SBC/5



High-speed Universal Filler (500 cpm)



High-speed Solid and Liquid Filler (300 cpm)

A10 Can Filler (30 cpm)

MODERN FILLING MACHINERY

These modern machines are part of a new and complete range of designs by Mather & Platt Ltd for the canning industry.
They combine a high degree of accuracy with high speed and simple and economical maintenance.

Mather & Platt
LIMITED

RADCLIFFE
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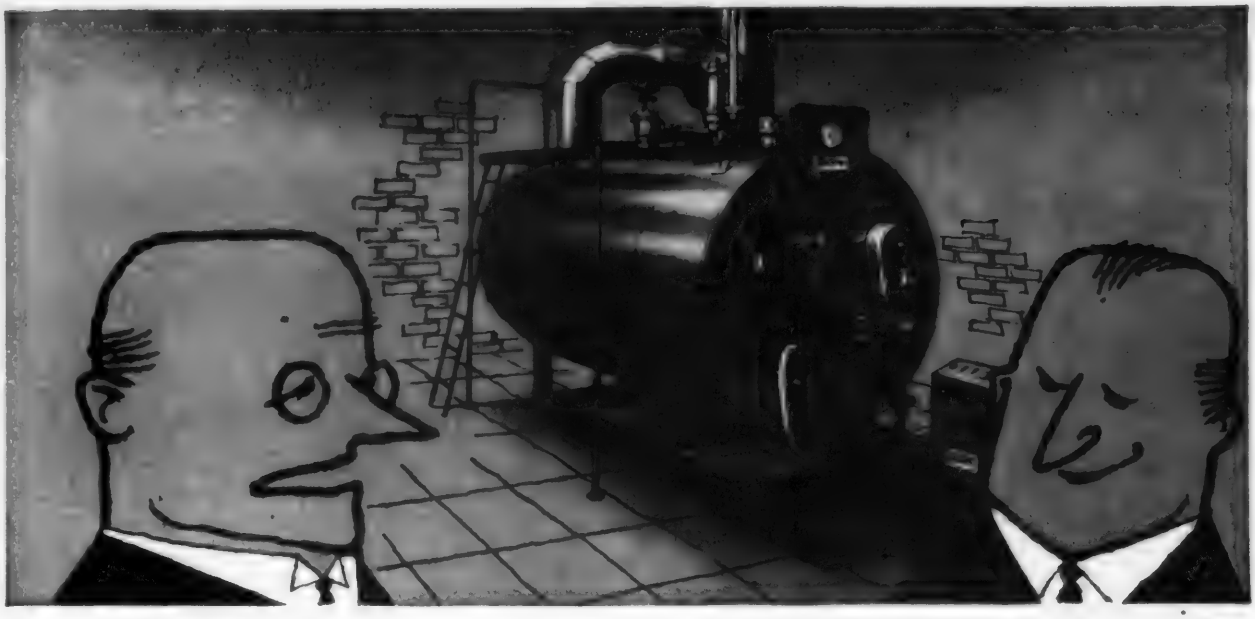

Smuts? that's the name of the cat!

We have a very fastidious customer (we like him). He is in the food processing business where everything must be spotless. He's a hard man to impress. We showed him a Multipac, working. We demonstrated its efficiency on varying loads (eighty-two point something it was). We opened it up and let him see how little soot there was inside after six months continual work. But he didn't enthuse.

We showed him what we meant by 'Clyde-built and tough', and we showed him there was no refractory brickwork to replace because the Multipac has a new sort of wet-back combustion chamber. We let him stop it and start it, and finger its smooth clean finish. (We were beginning to lose our smile.)

Then he called his assistant and put 'smut-catchers' on our chimney.

Counting smuts is tricky, apparently. But he didn't have many to count. In three days he was truly amazed. Multipac is the least smut-making boiler he has ever met. Well, of course.

We will gladly send you descriptive literature. But better still, write or telephone to say you are coming to see a Multipac at work. We'll be delighted.

This boiler can also be supplied for use with solid fuels.

Multipac

WET BACK FULLY AUTO
WITH FULLY MODULATING OIL BURNER

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Lilybank Works · London Road · Glasgow E.1

GI/11

Rapid pea/bean filling made clean splashless by new auto machine

Type 1FF 10-head Automatic Pea/Bean Filling Machine.

This new Kellie model

fills half the liquid, then the solids, finally the other half of the liquid. Air does not trap in the cans nor liquid overflow. Up to 180 cans per minute, in all sizes up to A2½. Self contained motor as illustrated or synchronised drive from the Double Seamer.

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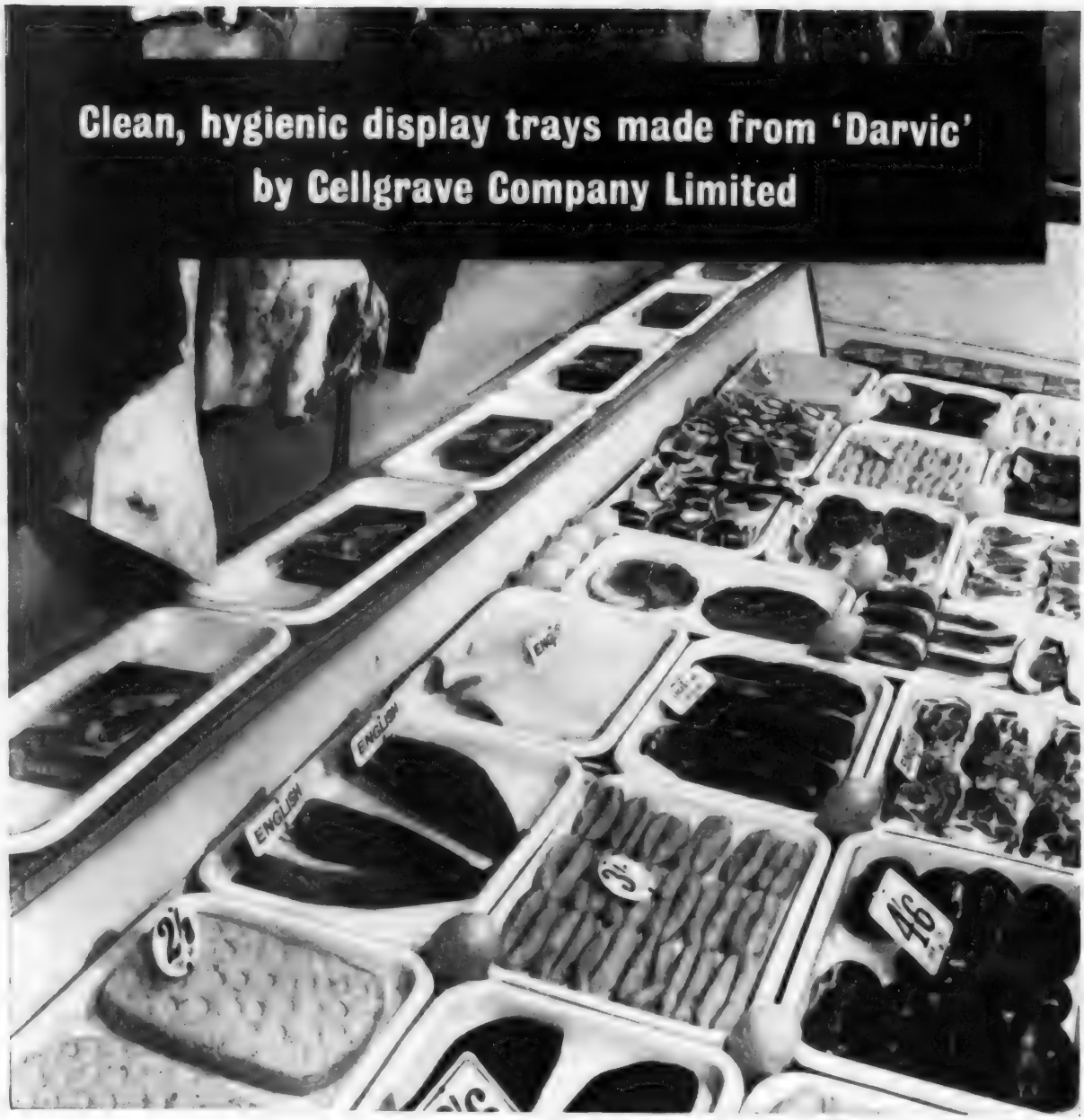
- "Viskring" can be applied rapidly by hand—no machinery is necessary.
- They are self-adjusting.
- They prevent the blowing or riding of stoppers.
- They prevent the movement of screw caps once they are tightened.
- They afford protection for branded products and reduce pilferage and evaporation.
- CELLULOSE CLOSURES . . . Contain No Metal . . . Require No Adhesive.

for your Sales sake fit "Viskrings"

THE VISCOSE DEVELOPMENT CO LTD

40 CHANCERY LANE, LONDON, W.C.2 Telephone: CHAncery 8111 Telegrams: Viskap Westcent London VC/4

Clean, hygienic display trays made from 'Darvic' by Cellgrave Company Limited



Trays made from 'Darvic' p.v.c. sheet by Cellgrave Company Limited, Philip Road, London S.E.15, a branch of Edward Kingston Limited, London.

These 'Darvic' trays make an eye catching refrigerated meat display for Edward Kingston Ltd. Hygienic 'Darvic' p.v.c. sheet will not taint food and is completely odourless. Its smooth, corrosion-resistant surface makes it very easy to clean. The trays are light yet tough. Their impact strength is high—in case you drop them. Because the thermal conductivity of 'Darvic' is low the trays can be used for display or for storage in refrigerated cabinets or rooms.

'Darvic' is easily shaped, is rigid even in thin sheets and is available in a wide range of attractive colours.

'DARVIC'

'Darvic' is the registered trade mark for the rigid p.v.c. sheet made by I.C.I.

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Ever growing demand shows us that we *are* satisfying the chocolate needs of Biscuit, Confectionery and Ice Cream Manufacturers—large and small. Whether you take 10-ton liquid chocolate deliveries or ¼ cwt. cartons of solid chocolate, you will find Caxton have the edge on quality and technical know-how. So wonderful in flavour and so smoothly flowing, Caxton couvertures are made by craftsmen for craftsmen.

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Versatile, water-tight, thermoplastic Oppanol BA
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It does not swell, rot or age. It is economical in use
and minimises maintenance. Once laid, it's laid for life!
Wherever a permanent seal against moisture is required—
in factory, kitchen, washroom and toilet floors,
in walls, roofs, foundations—it pays to lay Oppanol BA . . .
the plastic way to the perfect proof.

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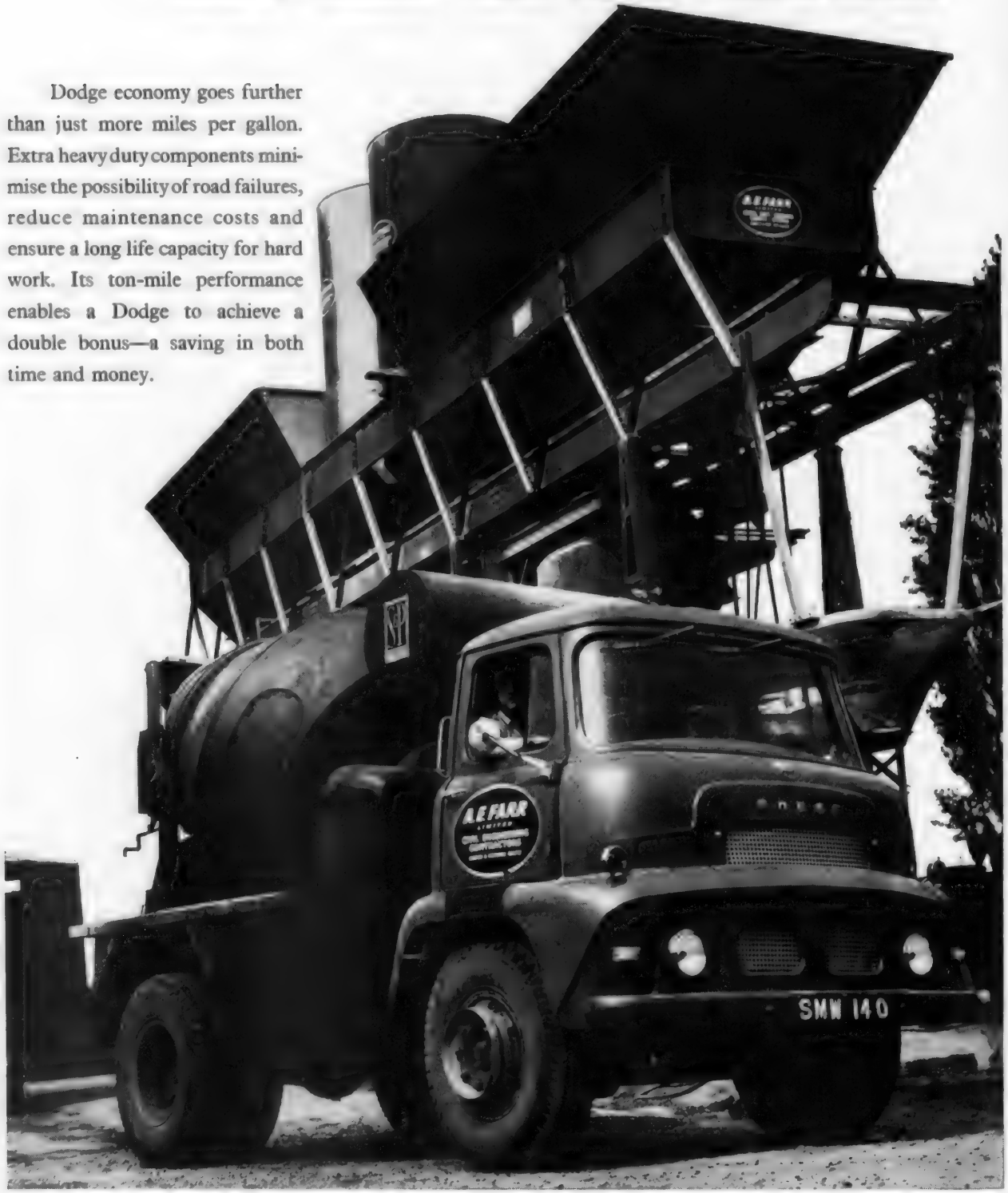

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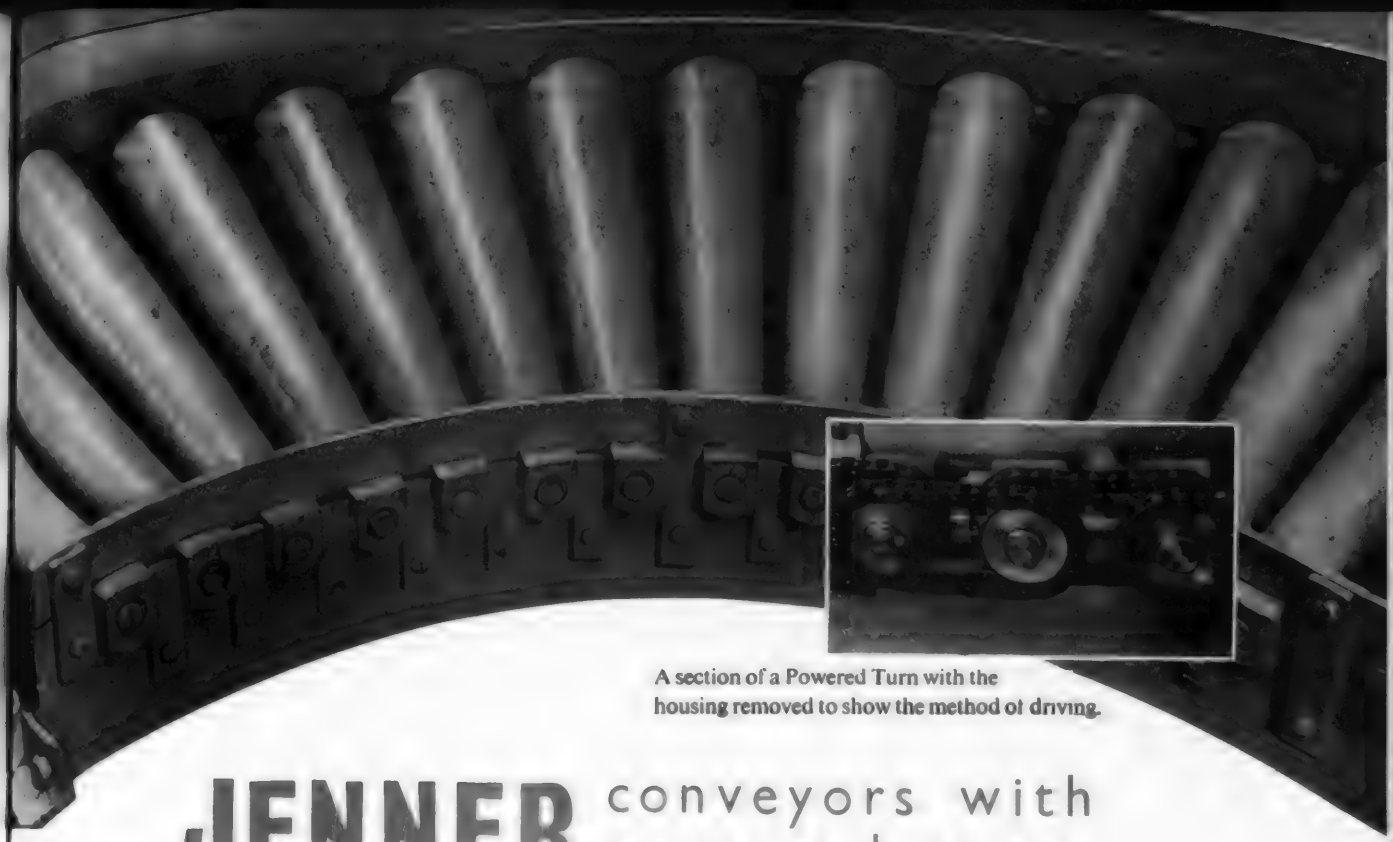

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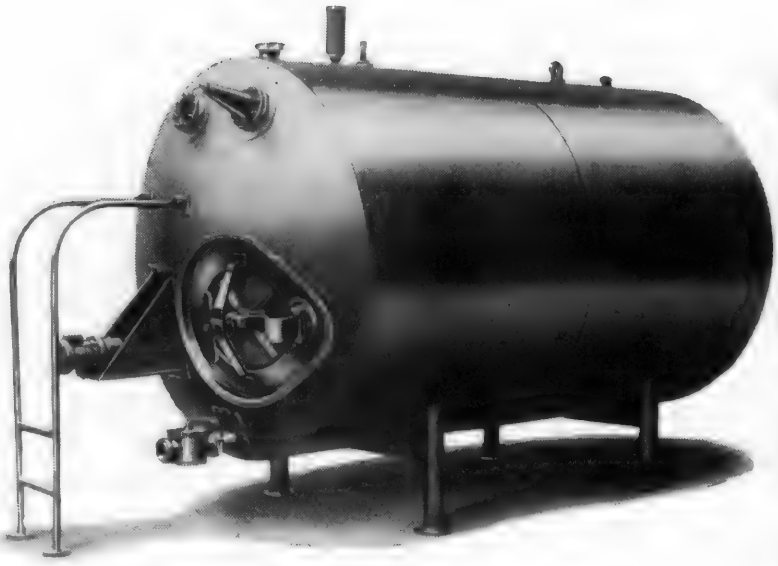

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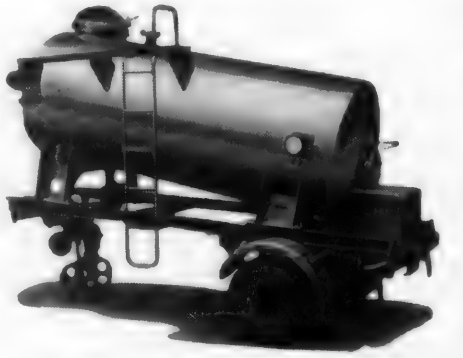

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CLEARSPAN Buildings have established a brilliant new conception of Industrial Building Design.

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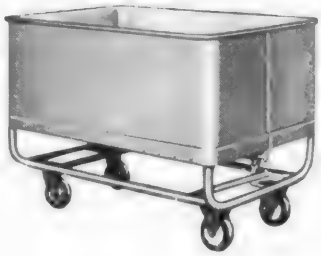

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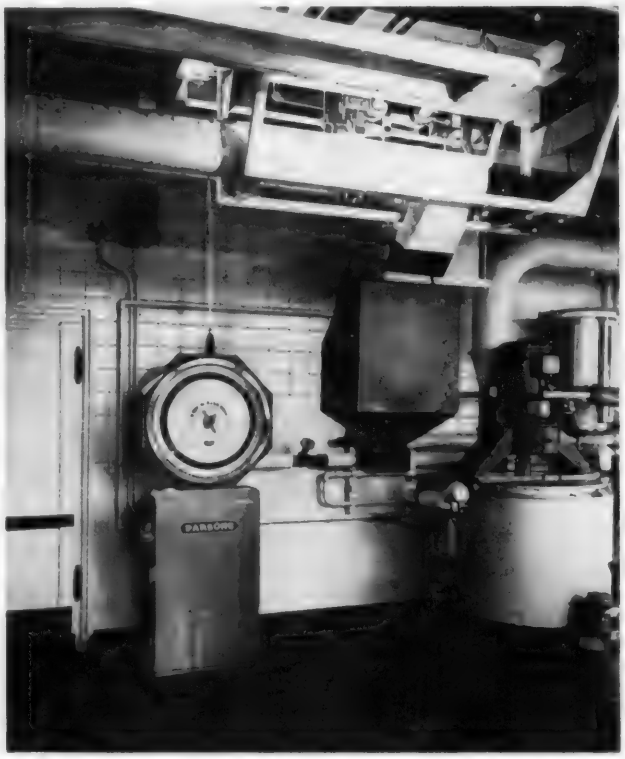

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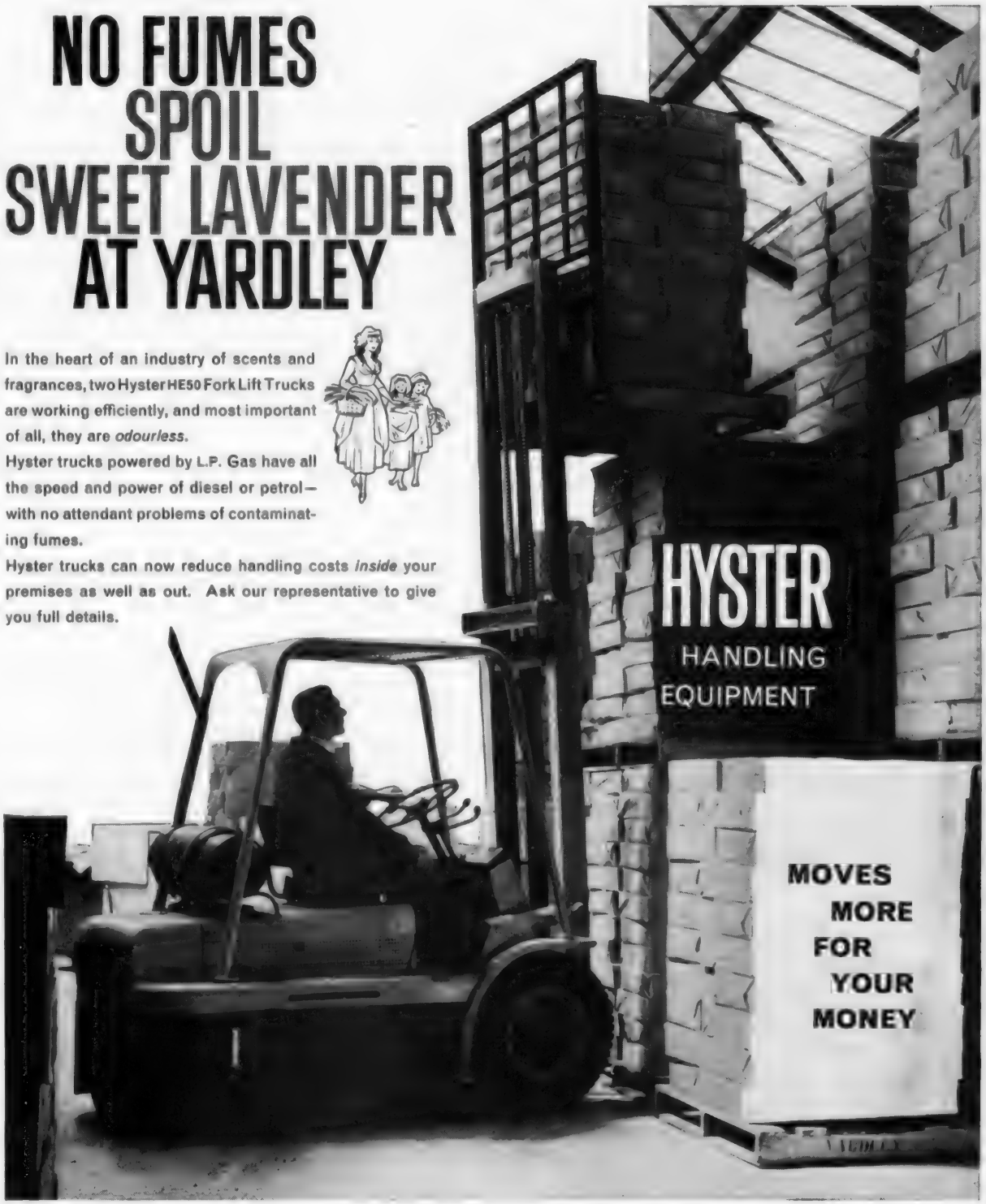

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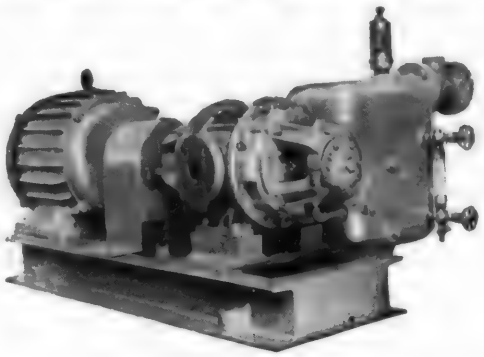

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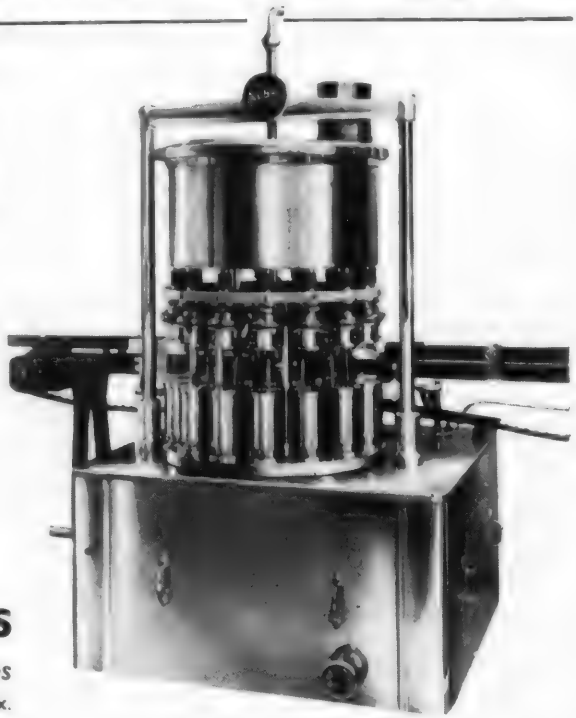

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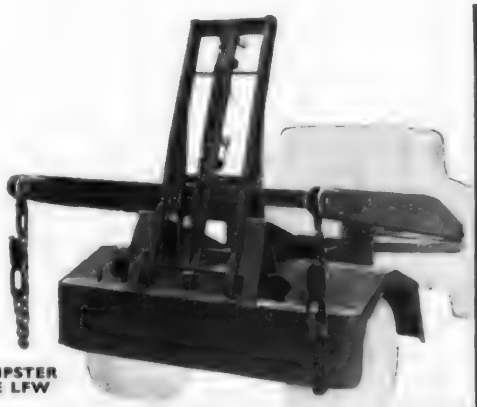
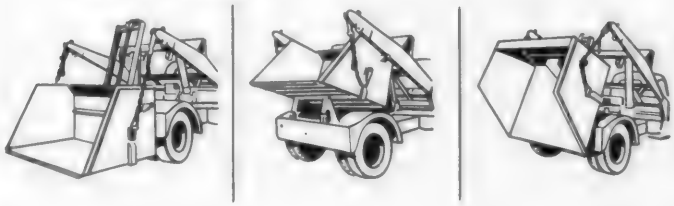


DUMPSTER TYPE LFW

TILT TYPES



Illustrated above is the type LFW. The assembly with hydraulic operation is mounted on a standard chassis. This will handle tilt type and drop bottom containers. The illustrations below feature the type GRD which again handles both tilt type and drop bottom containers with a fork lift specifically designed for high dumping.

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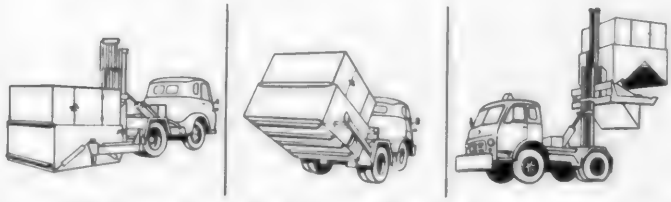

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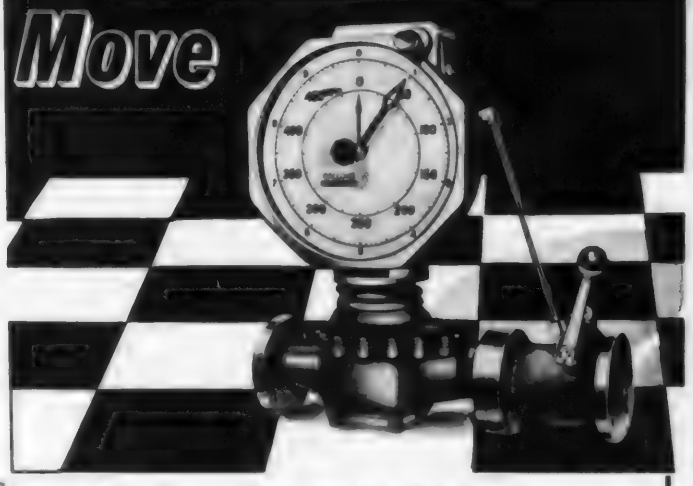

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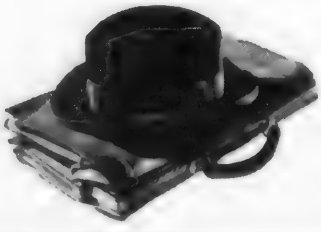

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FOOD MANUFACTURE

Vol. XXXIV, No. 12 December 1, 1959

1960—a year of commemoration

As 1959 draws to its close, thoughts naturally turn to the year that is to come. Two noteworthy anniversaries fall in 1960, the centenary of the Pure Food Act and the 150th anniversary of the start of the canning industry.

Neither event will be allowed to pass unnoticed. To celebrate the passing of the "Act for preventing the Adulteration of Articles of Food and Drink," a conference sponsored by a number of bodies, including the Food Group of the Society of Chemical Industry and the Ministries of Food and Health, is being held at the Royal Institution in London next September 20-23. Among those who have agreed to read papers are Dr. Norman Wright of F.A.O., Dr. J. G. Malloch, Scientific Adviser to the High Commissioner for Canada, and Prof. A. C. Fraser, President of B.F.M.I.R.A.

This conference should be an interesting one. When the Act was passed in 1860 it was the first pure food law to be made in any country, and was the forerunner of similar laws in most countries of the world. Since then, a science of food technology has systematically developed and a tradition of good commercial practice has grown up among manufacturers which ensures that all food reaching the public is clean and pure.

Few discoveries have had such an impact on human living as canning. The pioneering honours are shared by two men, the Frenchman Nicholas Appert, who in 1810 published a book, *L'Art de Conserver*, describing his successful research into the problem of preserving food, and the Englishman Peter Durand, who in the same year was awarded patent No. 3372 concerning the use of tin containers for preserving food.

The first commercial tinned foods in the world were being produced in 1811 at a factory in Bermondsey, London, by Bryan Donkin. It was the use of tin that enabled full use to be made of the discoveries of Appert, whose business in bottled foods, after a promising start, later failed. After a precarious couple of years, Donkin's business became a real success under the management of Donkin, Hall and Gamble, and imitators, some of them former employees of the London firm, were soon in the field, particularly in U.S.A., where patent rights could not be enforced.

In view of the universal benefits which canning has brought, it is not surprising that plans are being made in many countries to celebrate this important anniversary. In this country, in U.S.A. and in Europe fitting celebrations will be held, and the Comité International Permanent de la Conserve will mark the occasion at its annual meeting at Fez in Morocco, a place appropriately symbolising by its remoteness from the birthplaces of the industry, the ubiquitous benefits of this wonderful discovery.

Baking Research Association's progress

Dr. H. R. Barnell, who fairly recently succeeded Dr. Norman Wright as Chief Scientific Adviser (Food) to the Minister, is not new to the food industry, and at the recent annual luncheon of the British Baking Industries Research Association, whose chief guest he was, he wittily recalled the desperate days of 1948, when British-made biscuits were temporarily banned by the import authorities of the U.S.A., and he, together with Dr. Colgate (now head of the Association), Dr. Campbell of B.F.M.I.R.A., Dr. Nicholls of the Department of Government Chemist, and Dr. Moran of R.A.B.F.M. were despatched on a backs-to-the-wall mission to rectify the trouble.

If he is to be believed, some of his time in the U.S.A. was spent, as the youngest member of the party, in keeping in order the older ones, intoxicated as they were by the unaccustomed delights of a country which did not suffer to the same extent as we did the rigours of war-time austerities. He expressed surprise at being the guest of the Association, for, connected as he was with the first Director of Research, Dr. John Coppock, before even there were any laboratories or staff, he had come to consider himself almost a founder member. He paid rightful tribute to Dr. Coppock for his genius in developing the laboratories to the present esteemed position.

Dr. Coppock's place has been taken by Dr. Elton, who in the comparatively short period since his appointment, has shown a genius of his own in the vigour with which he is pursuing new lines of enquiry and in the results he has already obtained. Quite rightly, he has restricted the number of long-

term research projects to a small number, six to be precise, on which the staff's energies can be concentrated. There is more likelihood of valuable results being achieved by this policy than if the laboratory's capacities were dissipated on a large number of projects.

Dr. Barnell said that he had watched closely the selection of problems which Dr. Elton had made; it could be seen that these long-term projects were aimed at improving either the quality of the products or the efficiency of their production. In the early days of the Association, war-time shortages were still with us and work was largely concerned with substitutes and extenders. Those days are now fortunately gone, and if a national food research policy were to be defined, into which the objectives of the Association would have to fit, it would comprise making food clean and safe, reducing wastage and improving quality, and making food cheaper. In advising on quality control, increased productivity and improved quality, the association is well equipped to help in realising the aims of such a policy.

Rethinking in the biscuit world

ONE of Dr. Elton's long-term projects is biscuit technology. It is really surprising how little is known of the basic science of biscuit technology, a gap which the Baking Industries Research Association is doing its best to fill. Much of the country's biscuit production is in the hands of big manufacturers who have evolved their own recipes and largely automatic methods, and whose "know-how" has been gained by practical experience rather than by basic research. In this sphere, as in many others, basic research has lagged behind practical application.

For the first time since the war, this year's total tonnage of biscuit production, an estimated 520,000, looks like being less than the figure of the year before, 524,000, and even below the 1957 output of 522,000 tons. In previous years, production has climbed steadily from the 1948 figure of 265,000 tons, and it looks as though market saturation has been reached. There is a reasonable limit to the amount of any one foodstuff which can be consumed *per capita*, and any increase by a particular brand can only be at the expense of competitors. We can therefore expect to see a considerable increase in competition and advertising, especially by the larger firms.

An article in this issue describes how one biscuit manufacturer, previously of modest size, broke through to the national market by restricting the number of its lines, by giving them simple, impressionable names which themselves were heavily advertised instead of the maker's name, and by mechanising production to the limit. Some would say that this firm were lucky; they were in on the ground floor, when the biscuit market was a free-for-all with the certainty of enormous expansion after war-time shortages. But luck usually comes to those who deserve it, who make the most of fleeting opportunities. Tomorrow's opportunities will be of a different kind, the relentless end-play of a chess game where more subtle factors are involved than sheer force of numbers and the power of size.

One result of the rethinking which has been going on lately in the biscuit industry is that speciality lines are coming back into favour, a straw in the wind very encouraging to the many smaller manufacturers who may have watched with dismay the gargantuan strides of the big makers. Their ideas and inventiveness may enable them not merely to hold their ground, but even to strengthen it as the public becomes more discriminating and quality-conscious.

Water, water everywhere

PEOPLE in this country do not know what a drought, a real drought, means. So lavishly does the gentle rain drop from heaven upon this plain beneath that if three weeks go by without any, an official state of drought is declared. The village of Finningley, in Yorkshire, holds, we are told, the all-time record for continuous dryness, 60 days. When the score reached 56 last September, those citizens of Finningley who value such a doubtful distinction (but not the farmers) began to rub their hands in glee. Alas, on the 57th day it rained, and the record remained unbroken.

When we were in East Africa, we began to get a little conscious of the pervading dryness if six months went by without rain. By then there really was a drought. Not a blade of grass, not a shrivelled leaf of a desiccated shrub but showed varying shades of a uniform parched brown. The land, it seemed, was dead for ever. Clouds of dust swirled at the slightest breath of wind. One would have given the earth for an old-fashioned English drizzle.

When the rain did come, Nature performed a miracle. The "dead" earth almost overnight pushed up shoots of green, the brown shrubs turned green, everything became green, green, green . . . luscious, glorious colour, the symbol of life!

Why in this country do we have to endure the perennial affliction of drought, which in this summer now past caused sections of industry to shut down temporarily for lack of water? Something like 4% only of our annual rainfall is collected and stored, but only when water is short are we conscious of this vital fluid. Most of the time we take it for granted and use it with wasteful prodigality.

Industry is notoriously greedy for water, but in normal times there is plenty to spare. It is a sober-

ing thought that the single Heinz factory at Kitt Green near Wigan uses daily as much water as all the citizens of Wigan put together. Many firms make special arrangements for their own supplies; Fry's at Bristol, for example, have recently spent £50,000 on a water collecting plant, and many other firms, such as Westwick described last month, have their own boreholes. But the answer to the water problem lies in the provision of adequate reservoirs and storage facilities to make more effective use of our abundant rainfall.

Much of the water used by Los Angeles is piped from the Boulder Dam, 250 miles away. There is a moral in this. Redistribution of industry under the DATAC scheme will make heavy calls on local water resources; has adequate provision been made? The situation calls for an immediate national water policy by the Government.

"Operation Onion"

A "COMBINED operation" by the B.F.M.I.R.A., the National Vegetable Research Station, the Pickle and Sauces section of the British Food Manufacturers Association and the National Farmers' Union has triumphantly produced the Perfect Onion for Pickling.

Over the last few years, there has been a great deal of co-operative research between these bodies. Many varieties of the brown pickling onion, *Allium cepa*, have been tried on different soils in various parts of S.E. England, but principally in Norfolk, Cambridge and the Isle of Ely, to ascertain the effect of differences in soil and climate; different seedling rates and row spacings have been tried to determine what are the correct cultural conditions for producing a perfectly spherical onion, of a uniform small size and having the correct texture and flavour.

The field was narrowed down to a few cultivars, the quality of which was recently assessed by a panel of experts. The top selections were processed under identical conditions, and the final products were graded for colour, flavour, crispness and the absence of detached cores and bits. Thus have the ideal growing methods been determined and the "queen" onion at last found.

We naturally inquired what was the need for this elaborate investigation, and learned the astonishing fact that British pickles are not made from British onions—anything but . . . The onions used come mainly from Holland, Italy and Egypt. About 10,000 tons a year, worth between £25-£30 per ton, are required to produce 35 million jars a year, the present output.

This obviously cannot be allowed to go on, and the far-seeing British government has recently imposed a seasonal protective duty of 4s. 3d. per cwt. so as to encourage the British farmer to "grow more onions." As a result, a number of small farmers have already entered into contracts with the pickle manufacturers, and the commercial production of these onions has already started in trial plots. The growers have learned something about the crop, particularly with regard to correct harvesting and grading of the bulbs, and in all some 400 tons have been produced.

Yet another board?

Now that the perfect onion has been found, it will be possible to step up production on sound lines, but as more and more become available the present system of individual contracts will become increasingly troublesome. Sooner or later, it will be necessary for the growers either to offer their produce through middlemen, or to bulk and sell their graded onions through a co-operative selling organisation.

This problem is not a new one; small growers and small-holders the world over can never understand why they cannot sell direct to the large buyers—the millers and manufacturers—and thus obtain top prices, if their produce is of top quality. Particularly in remote areas, either a middleman or some form of selling organisation is always necessary for the satisfactory disposal of small lots of produce.

Let's have decent sausages!

"SNORKERS! Good oh!" cried Lt. Bennett, R.N.V.R., whenever a plate of sausages was put before him on the table of the ward room, which was pretty often. It was all right for him, he *liked* sausages, but his fellow-characters in "The Cruel Sea" expressed their opinions in more salty terms. We can sympathise, for war-time "bangers" were pretty horrible objects, even though they were supposed to conform to some sort of standard. Now, after 14 years of peace, sausages conform to no standard at all, and some of those on the market today would make a self-respecting vulture retch.

Germany, which treats the sausage with great respect, makes 2 million tons of it a year. In this country we make 300,000 tons, some, one suspects, with rubbish that would otherwise find its way to the pig swill bin. And why feed pigs with swill? Do human beings thrive on carrion? Why therefore should the animals which are to become the food of humans be expected to wax fat on the sweepings of the shambles floor?

The sausage industry of this country is hardly the most advanced in the food business. We mean what we say. The sausages of some well-known firms are horrible; the skins are rubbery and quite inedible. We learn that these firms mostly use skins of gut from their own slaughter houses. Imported skins

from America are finer in quality, because American pigs are given higher quality food on a more scientific basis. For this reason, too, American pigs are heavier, and of better and more consistent quality than their British counterparts.

Is this lack of uniformity one of the reasons why the British pig industry drifts from one crisis to another? Foreign interests spend considerably more time and money investigating the science of pig breeding, with considerable benefit to their sales and export figures, and to our cost.

German sausage makers, already referred to, use meat which has been carefully selected for the purpose. We are sure that not all our sausage manufacturers take this trouble. What is needed in this country is a more enlightened attitude to the sausage, on the part of both manufacturer and consumer. If the full benefit of better quality sausages is to be reaped, the housewife must be persuaded that it is not good enough to drop them into a frying pan, turn the heat on and hope for the best; they must be carefully cooked, with frequent turning and continual basting with fat.

This takes more trouble, but the results will be worth while, and the sausage will then become what it should be, a tasty dish in its own right instead of a breakfast adjunct or a snack.

When will quality standards be enforced and a minimum meat content laid down? The Ministry say the enforcement of a minimum meat content is "impossible" because of the difficulty of analysis. Rubbish! Why cannot inspectors check the amount of meat which goes in?

Naturally, better sausages will cost more, but we believe the public will pay willingly for quality. Butter sales continue at a high level in spite of record high prices, which shows the public pays for what it wants. Let us have some decent sausages!

Diet food from coconuts

INTEREST has been aroused in many countries by the possibility of countering protein deficiency, common among poor people in Asia and the Far East, with oil seed meals. The main difficulty has been that many of these protein foods are of low nutritional value and lack, in varying degrees, some essential amino acids such as tryptophane, methionine and lysine.

According to Drs. V. Subrahmanyan and M. Swaminathan, Director and Assistant Director (Dietetics) respectively of the Central Food Technological Research Institute of Mysore, coconut meal, a by-product of the coconut oil industry, may be useful as a good source of proteins of high biological value. Cereal products are generally deficient in lysine, and coconut proteins could be mixed with more abundantly available meals such as groundnut and soybean meal to produce a low cost protein food containing all the essential amino acids.

A major snag at present is that a satisfactory method of processing copra so as to improve the keeping quality of the meal has yet to be found. The value of the idea will also be enhanced by eliminating the fibre, which if not removed would interfere with the adequate utilisation of the protein.

Christmas

ONCE again the season of joy and festivity is imminent, and we take this opportunity of wishing all our readers a Happy Christmas. Food (not to mention drink) plays, of course, a big part in the material side of the seasonal jollifications, and in this prosperous Britain, at the close of a year when we "have never had it so good," all those concerned in the production and sale of festive fare, as well as the makers of the boxes and wrappings so lavishly used to pack it in, will be totting up their accounts with satisfaction and will be positively bursting with goodwill towards their fellows at the close of business on the 24th.

This is all as it should be. Fie upon all Scrooges who would dampen glee!

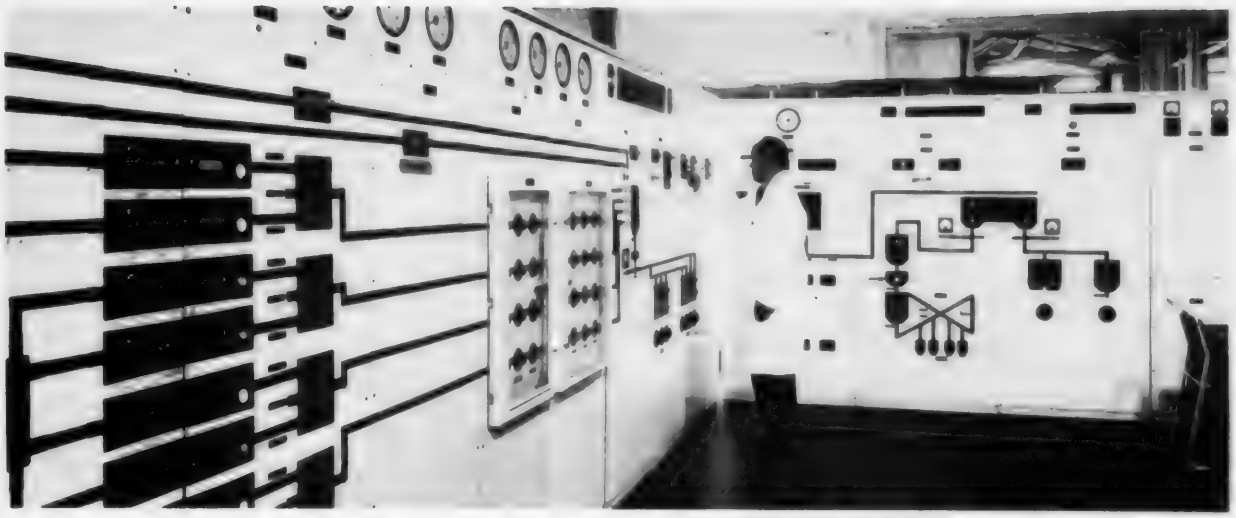
> "'Twas Christmas broach'd the mightiest ale,
> 'Twas Christmas told the merriest tale,
> A Christmas gambol oft could cheer
> The poor man's heart through half the year,"

said Sir Walter Scott, and so do we. But material prosperity is not all; although a good thing in itself, it tends to make us forget or ignore the deeper things of life, one of which is the real meaning of Christmas. The jollity and feasting is but the outward expression of the joy with which Christians commemorate the birthday 1,959 (or to be strictly accurate, 1,963) years ago of the Infant whom they serve. Christmas without this is meaningless, an empty feast whose only excuse is that "it always has been."

Science and technology heap wonder upon new wonder every day; two blades of corn grow where once grew only one, land which but yesterday was arid desert now bears fruit, precious food which once rotted within a few hours can now be preserved indefinitely. But the greatest wonder of all, the origin of existence itself, remains beyond the reach of science. We reap what we have not sown; we can rearrange but cannot create. Has anyone produced a blade of grass from nothing at all?

Let all men of goodwill thank God for providing the earth to live on, the air to breathe, the seeds to grow crops, the animals to provide meat, the water to drink, and the intelligence and reason which enables men to make the world a better place.

A Happy Christmas!



Part of the main control panel of the Glengarry Bakery, which carries a mimic diagram of the bulk-handling plant and on which the operation of every machine and the state of every storage vessel can be seen at a glance.

Near the Ultimate in Automation—I

How Macdonalds have simplified biscuit production

By concentrating on a few lines and raising automation to the limit, Macdonalds of Glasgow, before the War a small business, have become one of the leading biscuit manufacturers. FOOD MANUFACTURE recently visited their two factories, and in this exclusive article we describe how automatic bulk-handling machinery keeps up round-the-clock production with the minimum of labour.

"PENGUIN" biscuits are now known to every household from Land's End to John o' Groats, yet before the war the firm which makes them was a modest concern of some 200 employees, producing about 50 lines. Now the firm employs some 1,500 in its factories (the latest was opened at the end of last year) and the output of "Penguins" alone exceeds a million a day.

In addition to the famous "Penguin," other varieties made are "Glengarry," "Munchmallow," "Yo Yo" and the recently introduced "Bandit."

In 1921, William Macdonald started a grocery agency in Airdrie, Scotland, and six years later set up a workroom and began coating imported wafer biscuits with chocolate. These sold readily at 1s. a lb. In the following year, 1928, his two sons, William and Frank, joined him in partnership and a factory was established at Bridgton, Glasgow. This soon became too small, and in 1929 a larger factory at Cardonald, outside Glasgow, was taken over, and the range of biscuits was extended considerably.

In 1931 the firm established a foothold in the south by opening a factory at Slough, but this could not compete with rivals who operated continuous ovens (a pointer for the future), and the Slough venture was abandoned, efforts being concentrated at Glasgow.

At the outbreak of war the Cardonald factory was requisitioned, and production was moved to Glasgow's Hillington industrial estate where it has remained ever since. Nine months ago a second factory on the estate was opened.

Start of the climb

War-time production was controlled both by Government regulation and by availability of supplies. During the war, William Macdonald, Senior, died, and his son William became Chairman and Managing Director, and Frank became Assistant Managing Director. The brothers decided to risk all by a policy change aimed at capturing the national market.

The essence of the new policy was to concentrate on a few top-selling lines, streamline production by introducing the most modern machinery, and standardise quality and packing. The first product, "Penguin," a chocolate-

The control panels of the three batch mixers, the tops of which can be seen (*right*). The white box on top of each panel is the sequence controller, which, in conjunction with the dial weight controllers (behind the operator's back) automatically controls the entire mixing operation.

coated biscuit, was an immediate success; it caught on rapidly with a public starved of sweets and biscuits by war-time rationing.

"Munchmallow," a chocolate-coated marshmallow, followed in 1950, and "Yo Yo," a chocolate-coated round cream biscuit in several flavours, in 1954.

A fourth product, "Glengarry," is a shortcake biscuit and the only non-chocolate line that Macdonalds make. The most recent introduction is "Bandit," a multi-layer wafer sandwich with milk chocolate covering.

Unconventional policy

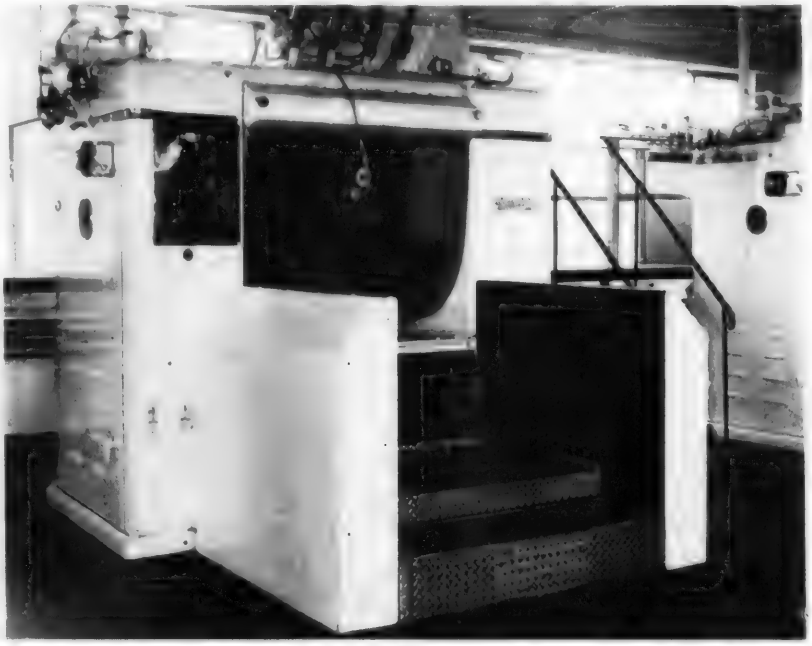
One of the reasons for Macdonalds' success is the complete absence of hesitation in abandoning conventional methods of manufacture and marketing whenever these have stood in the way of their policy. Thus from the first their production of biscuits has been based on number instead of weight; this meant individual wrapping, and, as soon as they could, the firm abandoned the conventional biscuit tin. At first this seemed to increase production difficulties and costs, but it has paid off handsomely, for individually wrapped items quickly pleased customers and invaded trade outlets where returnable biscuit tins were a nuisance.

Mindful of their experience in 1931 when they could not hold their own at Slough against competitors equipped with more modern machinery, Macdonalds actively follow the principle of having the best and most up-to-date equipment. It is not surprising, therefore, that they have embraced automation completely, and their bulk handling system in particular is technically one of the most advanced of its kind. A recent addition is the completely automatic control of ingredient blending which will be described.

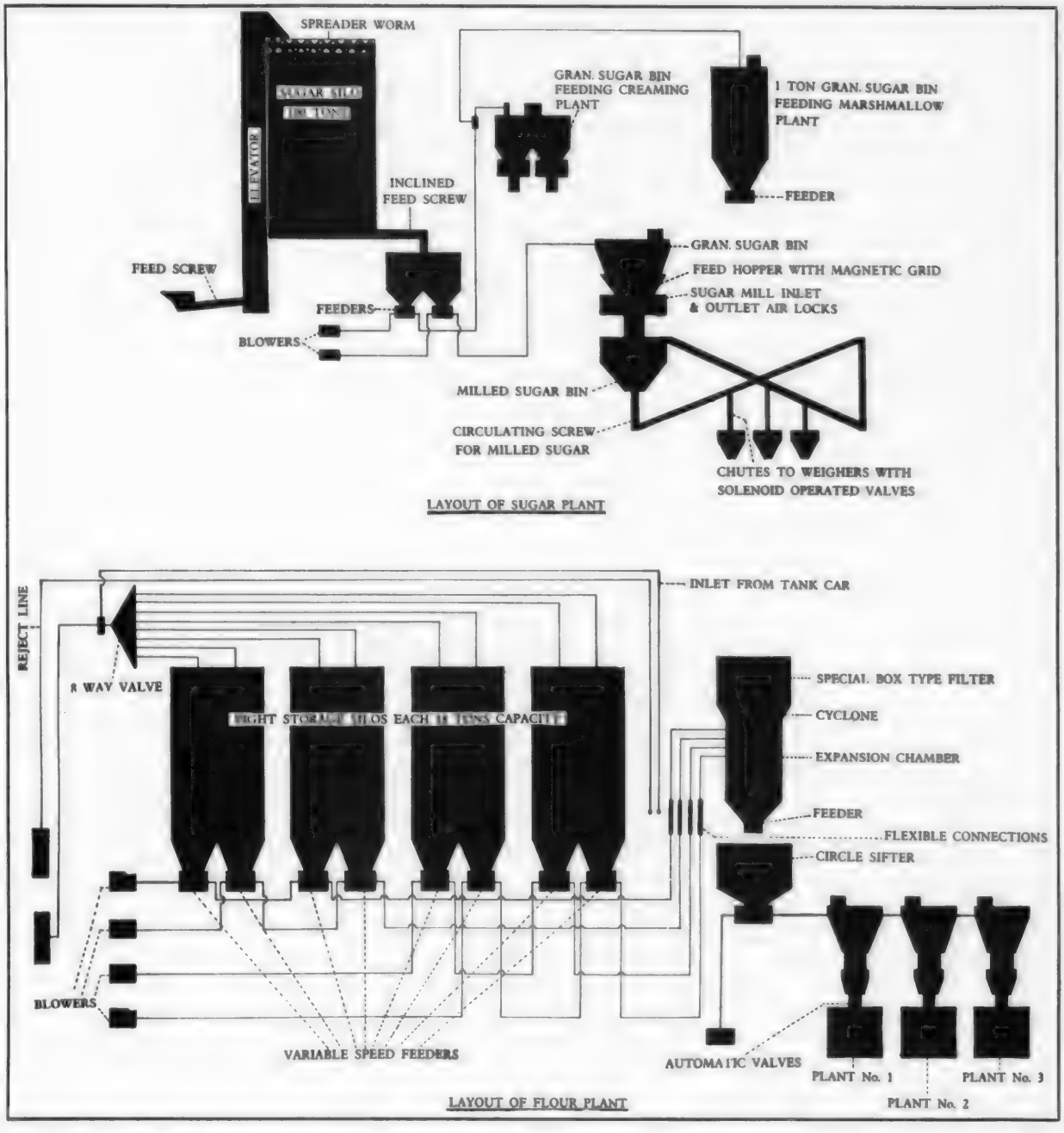
Raw materials

A new 3-storey building known as the South End Extension and completed only this year houses the storage and handling equipment for flour and sugar.

All raw materials are delivered by road tanker. Flour is delivered 14 tons at a time and blown pneumatically to any of the eight storage silos. Sugar is unloaded on to an extending screw conveyor (withdrawn into the building when not in use) and conveyed by bucket elevator to a steel-framed aluminium-faced wooden silo. Glucose is pumped by tanker-mounted pump to conical-based lithcote-lined steam-



One of the three Baker Perkins high-speed horizontal mixers. The platform in front of the mixer covers the discharge aperture, and when mixing is finished, the platform swivels upwards, the front of the mixer opens, and the contents are automatically discharged into a hopper on the floor below.



jacketed steel tanks in a heat-insulated room. Similar tanks hold invert sugar made in the manufacturing department.

Bulk deliveries of oils from suppliers are housed in a separate building containing ten 13-ton vertical cylindrical storage tanks; these are lagged and thermostatically controlled by base heaters. The required oils are drawn from bulk storage by a pipeline to the main factory where they are blended in a control room and then stored in their blended state ready for use in the mixers.

Chocolate, which is made to a recipe specified by the company, is all delivered in bulk by road transport in liquid form (at 110°F.) and is stored in 9 tanks of either 13 or 10 tons capacity spread between the two factories.

Flour handling

The tankers which deliver flour have their own discharging equipment. Each vehicle has a three-inch diameter discharge pipe for connecting to a similar-sized inlet pipe which leads to an 8-way rotary valve allowing the fluidised material to be pumped to any one of the eight storage silos.

The silos are arranged in pairs (total capacity is 144 tons) allowing four different kinds of flour to be stored at a time.

Discharge from the silos and the blending of the flour is carried out pneumatically by an automatic system for which a patent has been

applied. Any one silo of each pair can be selected from the central control panel. Flour is drawn from the bottom of the silo by a variable-speed rotary feeder, whose speed of rotation determines the rate at which the material is withdrawn. On the control panel, each pair of silos has a set of controls marked from zero to 100%, and by suitably setting the controls, up to four flour streams can be continuously pumped at controlled rates to a cyclone blender. Below the cyclone is mounted a sifter, and the blended flour from the cyclone is directed via the sifter to any of the 1½-ton service bins above the weighing hoppers.

Air from the cyclone is filtered and the flour dust is recovered at the end of the blending operation.

The firm have no problems regarding flour infestation for the simple reason that infestation has never been allowed to develop.

The filling of the service bins above the weighing hoppers is normally linked to the central control panel to provide a fully automatic sequence, but hand control is available for emergency use.

On automatic control, when the start button is operated in the control room, the plant fills up service bin No. 1 with the predetermined blend, moves on to service bin No. 2 with its respective blend and so on throughout the number of service bins. When all the service bins have been topped up with their respective blends, the plant shuts down and shakes all the box filters.

The plant then returns to service bin No. 1 and starts filling it again if the level control indicates that it is possible to do so. In this way the service bins are continuously topped up.

Discharge from the service bins is by a fluidised discharger through a rotary feeder.

The 900 lb. weighers below each service bin have three presettable pointers and one zero contact to enable three different ingredients to be gravity fed separately into the weigher, and to be discharged until the weighing needle reads zero, at which point a control desk indicator shows that the next operation has automatically started.

The bases of two of the grain silos, showing the automatic discharge mechanism and the control boxes.

Fat storage tanks.

Bulk sugar

Sugar is delivered in 14-ton tankers which discharge by gravity through a rear spout that registers with a screw conveyor, which extends from the silo house when required and is withdrawn after use.

The inlet screw, bucket elevator and spreader screw which feed the single 100-ton storage silo have a capacity of 40 tons per hr., and a tanker can be unloaded in 20 min.

The storage silo, which is air-conditioned, is built of aluminium-faced wooden block board constructed in a steel frame.

The quantity of sugar in the silo is remotely indicated on the control panel by means of a capacitance cable which connects to a dial on the panel reading in tons.

(To be concluded)

Chemistry and Meat Curing

By H. C. Hornsey,* F.R.I.C.

From time immemorial, salting has been carried out as a means of preserving meat. Today, although colour and colour stability are of paramount importance with cured meats, it must not be forgotten that the salt preservation effect is still essential. This article discusses some of the chemical effects.

LEAN meat contains approximately 75% of water. Dissolved in this meat juice are many substances, including lactic acid, proteins and amino acids, etc. When meat is put into a strong salt solution, therefore, it may be considered as a mixing of two liquids, although clearly it never proceeds to actual completion. The brine will be diluted with meat juices diffusing outwards from the meat, and the juices within the meat will be diluted with brine diffusing in. This two-way traffic, however, is slow and takes many days before the salt penetrates to the innermost parts of a thick joint. Thus recourse is made to preliminary pumping, *i.e.* injecting the brine directly into the interior of the meat. This, even with multiple injections, still leaves the salt in small pockets, and several days must elapse for the two-way diffusion to take place between the pockets and the surrounding tissue.

The resulting meat still has a water content of approximately 75%, but now this water has between 5 and 15% of salt dissolved in it. This has a profound effect on any bacteria which may find their way on to the product. Most types of organisms will be inhibited to such a degree that if any growth does take place at all, it will be very slow.

This effect will be greater the higher the salt concentration, thus the modern trend for "mild" cures does lead to slightly more vulnerable products. When the surface of cured meat becomes dry, the salt concentration in the outer layers (where bacterial contamination is most likely to occur) will rise considerably, thus forming a protective layer. Conversely, if cold, cured meat is exposed to humid conditions, the surface will, for some time, have pure water condensed on to it, giving a weaker salt concentration and, therefore, a weaker preservative action on the outside.

* Chief Research Chemist, J. Sainsbury, Ltd.

Brines

In traditional curing such as the Wiltshire tank method, the used brine (which is now diluted with meat juices) is strengthened with salt, etc., if necessary and reused. The nutrient meat juices in the brine now enable some of the special types of halophilic organisms to grow in it. The types which may be called the curing types are usually the first to develop, and during their growth cause a double chemical reaction to take place. Lactic acid[1] appears to be oxidised, eventually to carbon dioxide and water; nitrate is utilised as the source of oxygen, and is reduced to nitrite, required for colour development.

After several batches have been cured by the brine, this reaction, and the growth of the curing organisms, may reach such a level that nitrite itself can be used as a source of oxygen as well as the nitrate, to oxidise more lactic acid, and is thereby reduced to gaseous nitrogen and free alkali. If these reactions proceed unchecked, nitrite is first formed, then decomposed, and the gaseous nitrogen causes a frothing in the brine. Free potassium carbonate is also formed from the alkali of the nitrate/nitrite combining with the carbon dioxide from the lactic acid. The *p*H of the brine, therefore, rises, and this in turn accelerates the bacterial growth. If there is no further lactic acid or other easily oxidisable substance left, then it becomes the turn of the amino acids present in the brine to be utilised and the resulting end products give rise to unpleasant "off" odours.

Although the bacteria responsible for these changes do grow in strong salt solution, their rate of growth is increased if the brine is allowed to get weaker in salt and vice versa. For this reason it has been suggested[2] that control of the bacteria, and therefore nitrite concentration, may be achieved by varying the strength of the salt solution as necessary. An efficient filter or centrifuge may also be used, which physically removes most of the bacteria, without affecting their rate of reproduction which is necessary for the full development of the brine. By this means the effective potential of the brine is retained, but the magnitude of the chemical changes caused are kept within reasonable bounds.

It sometimes happens, however, particularly if the salt concentration is kept rather high, that other types of bacteria may become dominant in the brine, and either entirely stop, or at least markedly decrease the above chemical changes. These organisms are rather oxidative by nature and cannot bring about the reduction of nitrate to nitrite, in fact they may even oxidise any nitrite that

is present back to nitrate. No lactic acid is therefore used up, and hence the brine gradually accumulates more and more lactic acid from the meat juices. This type of brine lasts indefinitely, is very acid (*p*H 5·0 or less), a dark dull brown colour, does not use up any nitrate, forms little or no nitrite, and hence its curing properties are only poor. Even with these brines, however, some nitrite may be formed in the thin layers of brine which are immediately adjacent or even just within, the surface of the meat, where some curing bacteria may be present. In comparatively large-scale manufacture, however, these brines are not frequently found. They tend to occur more with brines which are not used very frequently and where the salt concentration is rather high.

Colour

The typical colour of cured meat is due to the formation of nitrosomyoglobin (nitric oxide myoglobin) from myoglobin, the normal pigment of fresh meat. The production of this nitrosomyoglobin is the other important role of curing. The extent to which the myoglobin originally present is changed to this pigment is a measure of the efficiency of any process. Obviously one is limited to 100% conversion of the original fresh meat pigment as the best possible colour; therefore the amount of pigment in the fresh meat becomes important and limits the maximum colour obtainable after curing and processing.

In practice, 100% conversion to the nitroso form is not reached. In traditionally cured uncooked bacon, the pigment is usually 30-40% converted. After low temperature smoking it will increase somewhat to 40-50%. With a high temperature smoking process (150°F. and over), an appreciable increase occurs, and 60-80% of the pigment is present in the nitroso form. After cooking, values of 85-95% are usual in both cases.

In the final product, after curing and cooking, the nitrosomyoglobin is liable to undergo oxidation by the air, to a yellow-brown pigment met-myoglobin. This oxidation proceeds mainly through the agency of light energy, and it is found that the amount of fading is directly proportional to the amount of light reaching the surface, *i.e.* is proportional to the intensity of light and to the duration of exposure. Minimising this light "fading" and retaining the maximum proportion of pigment in the nitroso form has, in the last few years, been a major task for food technologists and has not yet been fully overcome, although, as will be discussed later, some improvements may be obtained.

Nitrite

The pigment of cured meat is formed from the fresh meat pigments, by reaction with nitrite. In traditional curing this nitrite is formed from nitrate in the brine by bacterial action, but increasingly now the nitrite is added as such to both pumping and tank brines, this method lending itself to more rigid control.

Also, being independent of maturation, a new brine is as efficient as an old one. Only a small amount of nitrite is actually needed to combine with the pigments (5-10 p.p.m. for pork), but as has been shown, a large part of the conversion of pigment only occurs at the high temperature stage, *i.e.* cooking or high temperature smoking. A small but definite reserve of excess nitrite must, therefore, be available to carry through to the cooking stage (where a slight loss of nitrite may occur) so that there is enough present to ensure the full conversion which then takes place. Generally a value of approximately 50 p.p.m. in the fresh cured material is regarded as a satisfactory minimum value.

Curers generally are still of the opinion that the presence of a little nitrate is beneficial to the cure. Another advantage which has been demonstrated is that the slight bactericidal properties of nitrite are enhanced in the presence of nitrate.

Sugar

With the increasing demand for "milder" cures in bacon and ham products, particularly in the U.S.A., it has become the practice to include sugar in some curing brines. Many and varied claims were made for this procedure at first, more perhaps, based on the expected behaviour, because of the known chemical reducing properties of sugar. However, there have been recent claims[3] that little or no improvement in colour production or resistance to fading results from using sugar. Its use, of course, may be desirable on the grounds of flavour.

Sugar is sometimes used as a pre-slaughter feed for pigs, but this aspect will be considered under *p*H.

Ascorbic acid

Ascorbic acid or its synthetically prepared twin iso-ascorbic acid and their sodium salts are strong reducing agents and have an affinity for oxygen. In the U.S.A., the Dept. of Agriculture in Meat Inspection Memorandum No. 217 and Supplements, 1955, permits the use of these substances in curing and pumping brines, cooked cured meats, and solutions applied as a coating to the outer slices prior to packaging.

The general reducing property of these substances is useful in curing and maturation processes,[4] as it helps to secure a better conversion of pigment to the nitroso form, assisting the natural enzyme system to bring about the necessary reducing conditions. Hence, an improvement in the pigment conversion during the curing process can be obtained. This is most beneficial when the colour at the uncooked stage is very important.

With goods the manufacturer is cooking before sale, however, this aspect is not quite so important, always assuming that full colour can be developed during the heating process.

There is probably a tendency for a greater degree of conversion to occur during cooking in the presence of ascorbate, but as an 85-95% conversion is obtained

anyway, the gain at this stage is not quite so important.

During the life of the finished product, however, the use of ascorbate does appear to be valuable. Firstly by acting as a reserve of reducing material, it will assist in re-reducing any pigment which has become oxidised, and secondly, probably the main effect, it will by virtue of its affinity for oxygen, act as a protective buffer by competing with the nitroso pigment for any available oxygen. This effect will, of course, only last as long as any ascorbate, unoxidised by air, remains. For this reason it is frequently used in the U.S.A. as a thin covering applied by spray to the surface only, where it is most needed. By this means a small amount of ascorbate is concentrated where it can be most useful, instead of being spread evenly, and therefore more dilute, throughout the meat.

The cost of ascorbate, however, particularly in this country, is enough to make its indiscriminate use out of the question.

pH and pre-slaughter fatigue

The acidity/alkalinity of meat is one of its most interesting properties, and has a profound effect on the behaviour of the meat during processing and cooking.

Freshly killed animals contain in their muscles a (variable) amount of a substance, glycogen. After death, and on the completion of *rigor mortis*, this glycogen is transformed into lactic acid. Clearly the amount of glycogen originally present at the time of slaughter must limit the amount of lactic acid subsequently formed, and is thus the largest factor governing the ultimate *p*H of the meat.[5]

The amount of glycogen present in the muscles of the living animal can, to a certain extent, be controlled. The work of Callow showed that fatigue leads to a low level of glycogen. Hence the slaughter of a fatigued animal leads to only a small production of lactic acid in the muscles, yielding meat of high *p*H, *i.e.* less acid than usual. Conversely, an easy journey to the abattoir, together with a rest overnight, leads to meat with more acid, *i.e.* lower *p*H. A similar effect of field exercise over a long period, as distinct from say, stall or sty life, would be expected to lead to a somewhat higher level of *p*H.

In general, a muscle which naturally has to do frequent work, has a greater glycogen consumption and also a higher pigment concentration. It is usual, therefore, to find a connection between *p*H and pigment concentration between different muscles.[6] With an increased *p*H due to a short-term fatigue just before slaughter, however, the pigments of the muscles will not have changed significantly. Only prolonged habit would be able to bring this about.

The feeding of sugar to pigs prior to slaughter, which has been developed mainly in Denmark,[7] also yields a greater amount of glycogen in the flesh and hence to more lactic acid and a lower *p*H of the meat.

One effect of *p*H is that it appears to alter the colour of the raw meat to a certain extent. Pederson[7] is of the opinion that this is caused not so much by any influence on the actual pigment, but because of changes brought about in the background protein of the meat. As will be realised, a certain amount of pigment present in a milky-white matrix and the same amount of pigment in a clear colourless jelly, will appear to be of a different colour, or at least of a different "brightness," when viewed in reflected light. The effect of increased *p*H on a protein free from pigment, would be to render it more transparent, and it becomes reasonable to assume, therefore, that this effect is the main cause of the "dark" or dull appearance of uncooked meat with a high *p*H.

Lean meat, both fresh and to a certain extent after curing, still has a definite although slow rate of respiration of oxygen. Certain enzyme systems of the live animals are still present and capable of causing some changes in the complex array of different substances present. Lawrie,[8] concerned mainly with dark-cutting beef, demonstrated that an increased *p*H of meat is usually associated not only with an increased pigment concentration, but also with an increased succinic dehydrogenase system. This last is a part of the chain of enzymes concerned in the residual respiration of dead muscle previously referred to.

It may well be, therefore, that the phenomenon of "dark-cutting beef" may have its counterpart in pork, although at the pork level of pigmentation it does not appear as such a marked defect. In addition to the increased amount of enzyme with higher *p*H, it must also be mentioned that enzyme systems usually have a maximum rate of working at a certain *p*H, which is on the alkaline side by comparison with the normal *p*H of meat. There will, therefore, be an increased activity with an increased *p*H, even without the actual increased *amount* of enzyme.

*p*H is also important when the cooking of meat is considered. It is now well established that the lower the *p*H, the greater is the weight loss during cooking. As was mentioned with regard to colour, the effect of increased *p*H on the main protein portion of meat renders it more transparent. This is just one effect of the protein having become more attached to its associated water. This appears to be more firmly retained at high *p*H values, and as well as being apparent visually in texture and colour of the raw meat, it also tends to lose much less water or exudate during cooking.

*p*H again is a very important factor when the bacteriological implications are concerned. As with enzymes, so with bacteria and moulds, etc. They prefer and multiply more rapidly on meat of high *p*H than more acid meat.

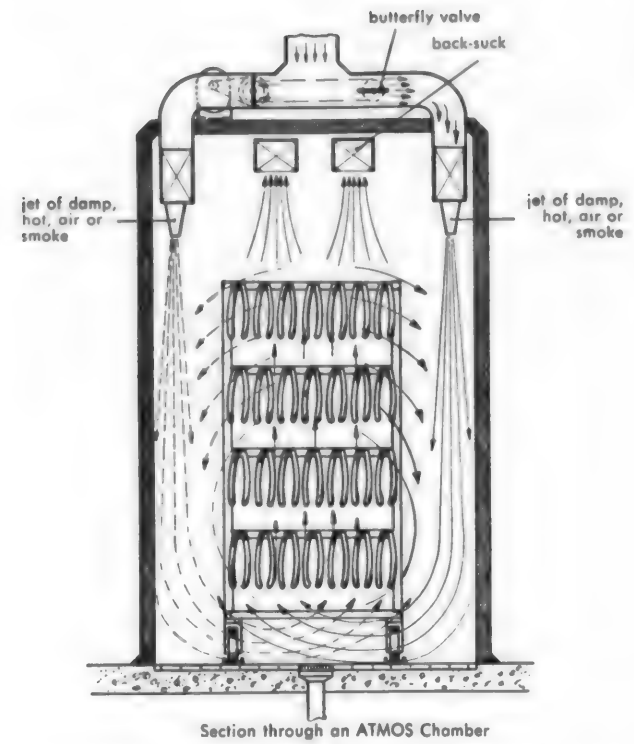
Manufacturing considerations

It can be seen from the foregoing, therefore, that a certain amount of influence on the quality of the finished product may be induced by the pre slaughter and subsequent treatments. This could be of use to manufacturers if cer-

(Concluded on page 473)

MEAT

Smoking, Curing and Cooking Equipment



Section through an ATMOS Chamber

Smoking

MUCH work has been carried out in the last 20 years on meat curing and smoking processes to reduce cooking losses, damage and spoilage. It is well known that if sausage goods are smoked properly, they will keep fresh longer than any product preserved purely by chemical means, besides acquiring a flavour which no chemical preservative can give.

Until about 10 years ago, the only people in this country who were smoking such things as luncheon meat, saveloys and frankfurters, which benefit from being smoked, were a few butchers either of German origin or German trained, but now the process is gaining ground and a large number of British manufacturers have installed smoking equipment.

Foodtech, Ltd., have produced a smoke oven in which all types of sausage goods can be smoked, cooked and douched and which can also handle bacon. This type of oven can be supplied, dimensioned according to the customer's specification, in stainless steel, aluminium or galvanised iron, and is suitable for frankfurters (up to 500 lb. can be processed in 1 hr.), pork or beef luncheon meat, saveloy, mortadella, cooked salami, etc.

The products to be smoked are loaded on to a trolley which is wheeled into the smoke oven. Smoke is generated from sawdust ignited either by gas or electricity under thermostatic control; frankfurters, for example, are smoked for 45 min. at 160°F., after which a steam valve is opened, the temperature raised to 170°F. for 7 min., and then a cold water douche valve is opened, which cools the frankfurters so that they are then ready to be put into cold store.

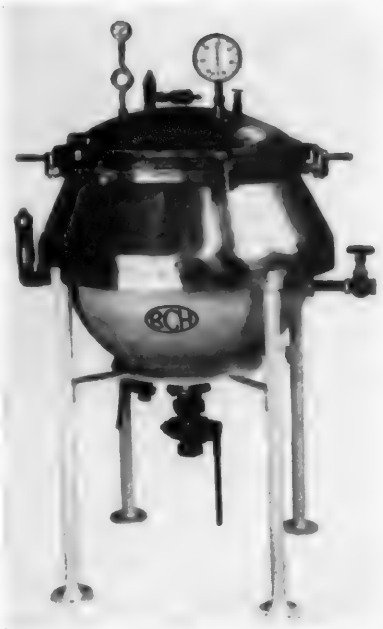
Special hooks are provided for smoking bacon, which is smoked initially at 150°F., and the temperature then automatically reduced to 59-68°F. and kept there for 12 hr. Westphalia ham, the makers say, is smoked for 1 hr. at 180°F. before being cooked, during which a handful of juniper berries introduced into the sawdust impart a unique flavour.

In the construction of their ovens, Foodtech, Ltd., say that full advantage should be taken of existing insulation within the building. If floor space is limited, vertical tower ovens up to 3 floors high and with a conveyor system can be installed.

This firm say that they are the sole agents in this country for the *Thermopulsor* machine which cooks sausage goods and meats by low humidity hot air, and which is claimed to give better flavour, texture and colour and a shorter cooking time than steam.

Stokes and Dalton, Ltd., are suppliers of the *Atmos* cooking and smoking system which can be used either for cooking and smoking any type of sausage goods and hams, or alternatively as a cookhouse or smokehouse only. Losses through evaporation and shrinkage are claimed to be cut to an absolute minimum, and a uniform colour is obtained at any part of the chamber.

The plant consists of chambers, varying in size and number according to the capacity required, which are of two kinds: model A, in which the walls, doors and roof structure with induction and expulsion channels and jets are of stainless steel, and which are provided with 2 in. thick insulation and are dismountable for easy exchange; and model B, which



A pressure cooker for meat, made by Wm. Brierley, Collier and Hartley, Ltd.

are permanent installations constructed of brick, given a watertight dressing, and if required can be embellished with exterior tiling. Brick chambers are not suitable for cooling, as rapid temperature changes are apt to cause small fissures.

Pipe connections and air circulation pipes are of sheet iron or stainless steel as required. Heating is by steam (6 to 10 atm.) or gas. The ventilators are fitted with self-cleaning impellors. Butterfly control valves are operated by a driving motor. Temperature and humidity control are automatic.

Drying, steaming, smoking, cooking and cooling can be carried out in a single process or each operation can be performed separately. Chamber sizes to accommodate from 1 to 10 waggons are available; the waggons may be put in and taken out from either side of the chamber, and various types of waggon, wheeled, overhead, with and without tipping gear, can be provided. Smoke generators may be simple or fully automatic, and are installed outside the chambers.

This provides a neat and flexible installation easy to maintain and clean.

Curing

Preservation of food by salting has been practised from earliest times, and the brining of meat was carried out by the Romans. A recent development is vacuum curing, in which brined meat is put into a vacuum chamber and left to cure in a partial vacuum; curing time is reduced by as much as half, because the meat fibres tend to expand, allowing better penetration of the brine.

An industrial machine for vacuum curing is the German-made *Vacu-Biga*, supplied by Foodtech, Ltd., which has a capacity of 400 lb. Ham, briskets, silversides, etc., can all be put into the same batch, hams and silversides being cured in 1 hr. and briskets and ox-tongues in 45 min. The meat is pumped with brine in the normal way and then put into the vacuum chamber, which is filled to the top, closed with the lid, and evacuated with the pump. After 3 sec. under vacuum, a valve automatically opens, allowing air to enter; when the container is full of air, the valve shuts and the air is evacuated again. This process is continuously repeated, the alternate evacuation and inflation expanding and contracting the meat and enabling the brine to penetrate through the fibres. For mass production, two machines are used; while one is operating the other is being pumped.

This firm also supply a brine pump by the same makers, which is operated by water pressure from the mains supply, no electric motor or connection being required. The machine is made of stainless steel, and up to 3 operators can pump simultaneously with pickling guns and needles also made of stainless steel.

Brine treatment

Centrifugal separators for the clarification of brine in bacon and pork pickling factories are offered by the Alfa-Laval Company, Ltd. By the use of these specially designed high efficiency hermetic separators a 97% removal of micro-organisms is claimed, with-

De Laval portable hermetic centrifuge type H.409-34H with a capacity of 200 g.p.h., for clarifying brines used in bacon curing and similar processes.

out boiling, settling or any other troublesome operations, and consequently a considerable labour saving is obtained.

The removal of the micro-organisms from the brine results in a better smell and taste which in turn greatly improves the quality of the meat. In addition, the yield of cured meat is claimed to be increased, since the efficient bacteria removal enables the brine strength to be reduced from the usual 24% to 22% which reduces the moisture loss from the meat. Also, by re-use, a clarified brine quickly becomes saturated with albumins, and further albumin loss from the meat is prevented. These two factors alone, it is claimed, increase the yield by as much as 4%.

These hermetic machines are made with all liquid contact parts of stainless steel or tinned phosphor bronze and with external finish of cream enamel and polished stainless steel. The machines, complete with necessary pumps, pipework and flow meters, are available in three sizes rated at 440-550 g.p.h., requiring 15 h.p., 175-200 g.p.h. (6 h.p.), and 90-110 g.p.h. (3 h.p.); the equipments can be base plate or trolley mounted.

The by-products arising from meat processing operations can also be dealt with using Alfa-Laval equipment. This includes a range of specially designed separators for blood, the De Laval Centriflow process for the continuous production of high grade edible fat at rates up to 15 tons/hr., and for smaller plants, a range of liquid/liquid/solid separators for the purification of fat at throughputs from 20 g.p.h. to 4 tons/hr.

Cooking

Among the large range of cooking vessels and autoclaves made by William Brierley, Collier and Hartley, Ltd., of particular interest is their stainless steel meat pressure cooker. The standard size is 55 gallons, but it is available in a large range of other sizes. The domed cover is hinged and fitted with swing bolts and quick release levers for easy charging.

Smoke, cook and douche ovens by Foodtech, Ltd. (*Top*): A typical installation. (*Bottom*): A small test installation.

It is designed for use at pressures of up to 100 p.s.i., and is claimed to give a cooking time of one-third that of an open pan, and to give a better product.

Meat press

The *Meta-Press* is a pneumatically operated machine for shaping boneless meat, including ham and bacon, and inserting it into cellulose sleeves or casings, and for compacting and closing the filled casing. Agents for this machine are the Oppenheimer Casing Co. (U.K.), Ltd.

The meat to be packed is placed in the trough of the machine and pressed by operating a foot pedal. A safety device ensures that the operator's hands cannot be trapped; the machine will not work until two buttons are kept pressed by both hands. The moulded meat is aligned with a nozzle, over which has been fitted a casing sleeve, and a further operation of the foot pedal pushes the meat into the casing.

The encased meat is then transferred to a complementary machine, the *Meta-Clipper*, which clips each end of the gathered casing with an aluminium clip, and which at the same time pulls the casing tight and compresses the meat.

First one end of the casing sleeve and then the other is gathered, placed in the slot of the clipper head, twisted and secured in the jaws of the tensioning clamp. This is attached to the piston rod of a pneumatic cylinder

Placing meat in the trough of a Meta-Press for encasing in a fibrous casing.

The encased meat is being compacted and the casing clipped in a Meta-Clipper.

which causes it to move towards the clipper head when a foot pedal is operated; when released, tension is exerted on the gathered end of the casing.

The makers say that with meat up to 8 lb. in weight per piece it is possible to obtain an output of 250 pieces per hr. with two men, one on the press and the other on the clipper. For meat up to 14 lb., the output would be about 125 pieces per hr., and for 20 lb. pieces about 80 per hr. With one operator for press and clipper, the respective outputs of the same weights would be about 100, 50 and 35 pieces per hr.

Material of construction is stainless steel, with chromium-plated piston rods and plastic tubing connecting the valves and cylinders. Air at 80 p.s.i. pressure is required; at the inlet a water eliminator and filter are provided so that the air flowing to valves and cylinders is free of water and dirt.

Synthetic sausage casings

Hypak fibrous casings supplied by the Oppenheimer Casing Co. (U.K.), Ltd., are a special type of cellulose casing comprising a paper core with a cellulose coating. This type of casing is claimed to be very strong and practically unstretchable, allowing it to be filled to high unit weight at high pressure.

These casings are claimed to be very suitable for such products as salami, mortadella, polony, smoked hams, briskets, liver sausage, etc. They take print well and can be perforated, allowing drainage of fat or water. The meat is cooked in the casing, which retains the natural flavour and juices.

Chemistry and Meat Curing

(*Concluded from page 469*)

tain advantages only were required. Thus meat from fatigued animals (high *p*H) and products made from them will:

1. be more prone to bacterial spoilage;
2. be of a poorer colour in the uncooked stage;
3. be of a softer, stickier texture in the uncooked stage;
4. have a tendency to be rather more coloured when freshly cooked and during storage;
5. lose less weight during cooking.

It would, therefore, appear that the advantages of high *p*H are more colour in cooked products, and a lower weight loss during cooking.

Whereas for uncooked bacon, low *p*H gives a better uncooked appearance and less liability to bacterial spoilage. The manufacturer of cured meat products, however, who requires the bulk of the side for uncooked bacon and the gammons, etc., for cooking, apparently requires what is not possible at the moment, *i.e.* an acid pig with alkaline legs.

The best solution would appear to be keeping to a certain compromise suitable to the particular requirements, with perhaps a diversion of both extremes, very high *p*H and very low *p*H, to the appropriate use.

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(*Left*): **The weighed and graded crabs are killed by removal of the back shell or carapace.** (*Right*): **The brine tanks in which the crabs are cooked.**

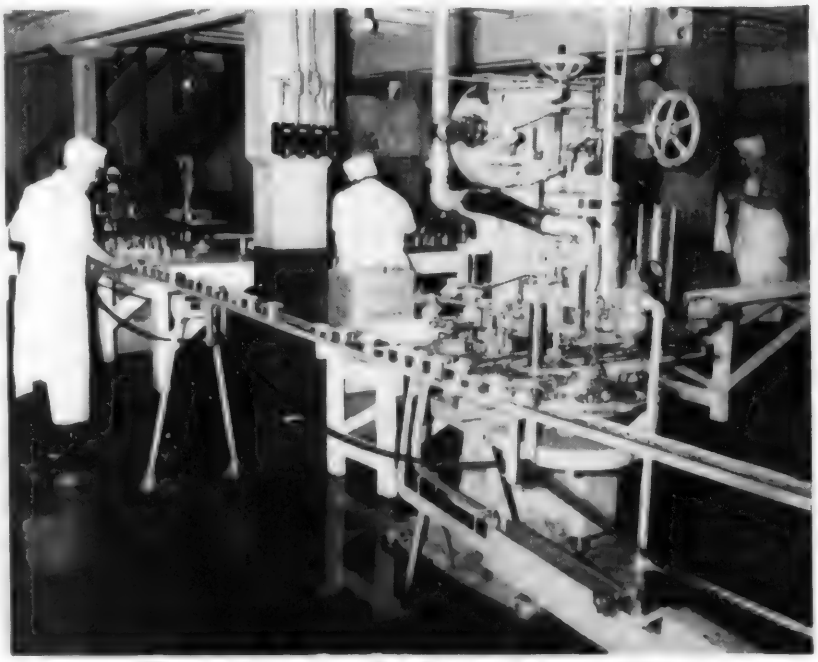
The Pacific Crab Canning Industry of British Columbia—II

By **Elliot B. Dewberry**, M.B.E., F.R.S.H., F.R.I.P.H. & H.

The first part of this article, published last month, described the characteristics and life history of the Pacific crab. This concluding part describes the processing and canning operations.

HISTORY records that the Pacific crab was canned commercially for the first time in British Columbia in 1917. The cannery was situated in Naden harbour, which was at that time the principal fishing ground. Later, however, the catches in this location noticeably decreased. Exploration for new fisheries took place, followed by the establishment of a cannery at Masset, north of the Charlotte Islands.

In 1929, Nelson Bros. Fisheries, Ltd., who are the largest canners in the crab industry, was incorporated, in order to pursue a general fishing business in British Columbia. During 1958 some 850,000 crabs were processed. In addition to the crab canning and freezing industry, the company owns a large fleet of boats engaged in fishing for salmon and herring. Their two modern processing



Filled cans being conveyed to the vacuum closing machine.

(*Left*): **These women pickers are removing the meat from the crab bodies by shaking them against the edges of plastic boxes.** (*Right*): **Cans being filled by hand with leg and body meat, after which they are weighed.**

plants are situated at Port Edward, near Prince Rupert, B.C., and at Steveston, near Vancouver, B.C., respectively.

Legislation

Canneries are controlled by the Meat and Canned Foods Act, 1954-58, and the Canned Fish and Shell-fish and Cannery Inspection Regulations of 1954-58. These regulations provide minimum standards for construction and sanitation, etc. Actual inspection of the canneries and canned fish products is administered by the Federal Department of Fisheries. Licencing within the Province of British Columbia comes under the jurisdiction of the Provincial Government.

Canning problems

The ideal aim of the crab meat canner is to treat the meat so that, on its removal from the can, the product is similar to freshly cooked crab meat—in colour, texture and flavour. This was by no means an easy matter in the early days, and a number of factors had to be eliminated or largely minimised before an acceptable product could be placed on the market.

One of the difficulties experienced was the blue discoloration in the meat after retorting and also the staining of the cans. In 1936 experiments were carried out to find some method to prevent this taking place, and one was to treat the meat with a dilute acid solution. This method of treatment gave very promising results, and no doubt facilitated the growth of a successful crab canning industry.

Elliott and Harvey (1951), as a result of their investigations, found that the copper-containing respiratory pigment of the crab's blood, hæmocyanin, was the agent responsible for the blueing of the meat, and suggested bleeding the crab by removal of its appendages.

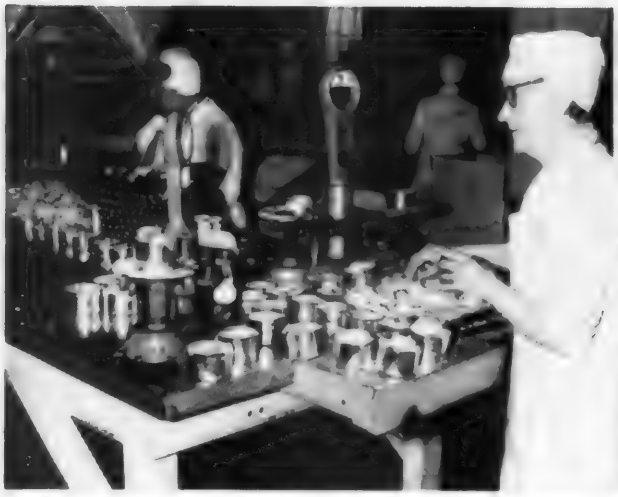
Faber (1953) recommended bleeding the actively live crab by making a puncture in the shell above the heart and placing the crab on its back for a few minutes. The colourless or blue-grey blood which exudes, changes to blue on exposure to the air. He also recommended soaking the meat in a 1% sodium citrate in a 95% sodium chloride solution for ten minutes and also using this special solution for all washing operations in place of plain water. The objection to these bleeding methods was the cost, which could not be justified where the discoloration problem could be solved by good plant practice.

The introduction of "C" enamel (sea-food formula) for coating the interior of the cans, which has been developed by the can production companies, minimises the discoloration of the tin plate and also enables packers to discontinue using parchment liners.

Other problems included shrinkage of the meat following the sterilisation process, which is linked with the toughening of the meat, leading to a rubbery, brittle or stringy texture: brown discoloration or scorching of the white meat, which sometimes results from certain retorting processes and the changes which may occur shortly after the crab has been killed, the meat becoming darker in colour due to the action of tyrosinase.

Canning crab meat is a complicated operation, and changes may occur during the process, sometimes leading to a depreciation in the value of the final product. The key to success depends upon the use of actively live, healthy, vigorous crabs, prompt butchering, cleansing and processing, cooling, and the prevention of contamination.

Valuable researches have been carried out on the biology and canning of crab in the Pacific Fisheries Biological Station at Nanaimo and the Technological Station at Vancouver, and the results have been of considerable practical assistance to the crab canning industry of British Columbia. It is essential in order to prevent contamination that all table surfaces, cooking and washing tanks, sinks and strainers,



(*Left*): **Filled cans being inspected and reweighed.** (*Right*): **Sealed cans being loaded into retort baskets for sterilisation.**

etc., which are liable to come into contact with the meat, should be constructed of stainless steel, aluminium or monel metal.

Quantity and value of canned crab

The following figures show the quantity and value of crabs canned in British Columbia during the past 3 years:

		(48-*lb. cases*)	
1956	...	6,610	$347,000
1957	...	7,766	$380,000
1958	...	13,246	$496,000

Over and above the figures for 1958 there was an odd quantity of 41 cwt., valued at $5,744.

Preparation for canning

The active live crab is killed by removing the back shell or carapace. This is accomplished by holding the crab by its rear legs, leaving the pincer claws free, placing the edge of the shell over a stationary hook or fixed horizontal metal bar on edge and giving the shell a sharp blow. The empty shells fall into a receptacle. The body is either broken in two or cut in half by bringing it down across a knife blade fixed to the table. The gills, viscera and intestines are removed and the halves thoroughly washed under a jet of clean water to remove any remaining viscera and fragments of the purple exoskeleton which may be clinging to the white muscle masses. Washing is sometimes facilitated by the use of revolving nylon brushes. In some cases the gills are removed by holding each section in turn against a stiff bristled brush.

Cooking

The halves are then placed in stainless steel wire baskets and lowered into brine tanks, which are kept at boiling point by live steam, and cooked for 10 minutes. This is just long enough to loosen the meat. The cooked crabs are dipped in clean fresh water, which cools the material to a temperature suitable for easy picking, while the retained heat allows evaporation of the surface water. They are then passed to the women pickers (wearing gloves), who remove the meat from the body sections by shaking and rapping them on the edge of a plastic box. This releases the meat without breaking it up in flakes.

The pickers use a small wooden mallet to break the shells on the legs and claws and shake or pick out the meat, which is placed in a separate plastic box. The body and leg meats are kept apart throughout the process. They are then removed to a "boning" or brine flotation tank containing a 100% solution of brine. The meat floats in this solution, and any fragments of shell sink to the bottom. From the flotation tank the meat passes on a conveyor and is again inspected for tiny pieces of foreign matter, then collected and dipped in a solution of citric acid having a *p*H of 2·8, rinsed in clear fresh water, and afterwards dipped in an 80 to 100% brine solution.

As a result of this treatment the meat has a *p*H of 6·7, which prevents any oxidation when in the can. The meats are drained, pressed to remove excess moisture, and passed to the packing tables.

Packing

Crab meat is packed in two can sizes, *viz.* ¼ lb. flat, and ½ lb. flat, which contain 3¼ oz. and 6 oz. of drained weight of meat respectively. All cans are lined with "C" enamel, "sea-food" formula.

A standard method of hand packing the cans is accomplished as follows: In the ¼ lb. can is placed a layer of body meat, and above this a layer of leg meat. The ½ lb. can has a layer of leg meat at the bottom, the centre filled with body meat and a layer of leg meat placed on the top. The leg meat of the Pacific crab is considered the higher grade.

The filled cans are inspected and check weighed to ensure that the correct amount of drained meat has been put into each can. They then pass on a conveyor to the vacuum closing and sealing machines.

Processing

The sealed cans are afterwards packed in the retort baskets,

Frozen whole crabs being inserted into polythene bags.

wheeled into the horizontal steam retorts and processed at a temperature of 230°F. for 80 min. The processing requires special care and control, as steam pressure around 10 p.s.i. may have an adverse effect on the colour of the meat.

After processing, the cans are immediately cooled, carefully examined, cleaned and labelled with the firm's special brand "Paramount" label, packed in fibre-board cases, and passed for sale to the Canadian markets.

Whole frozen crabs

The crabs to be frozen are placed in steam-heated tanks and boiled for 20 minutes, then scrubbed with clean water; rubber bands are placed over the legs to keep them in position.

They are put in wire baskets and immersed in a 100% brine solution at a temperature of −6°F. for 20 min.

The frozen crabs are dipped in fresh clean water for glazing and the rubber bands on legs removed. They are then wrapped in parchment paper or inserted in polythene bags and placed in fibre cartons each holding 12 crabs. The packed cartons are shipped under refrigerated conditions to the West Coast of the United States and also to Eastern Canada and sold under Nelson Bros., Ltd.'s., *Paramount* brand.

Frozen whole crabs, having been immersed in a bath of cooled brine, are being dipped into fresh water prior to being packed.

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Principles of Microbiology

To attempt to condense the basic principles of food microbiology into one book of moderate size, illustrate them, and serve the whole up in such a form that it may be used as a textbook is a rather tall task. William Carroll Frazier, who for the last 23 years has been a professor at the University of Wisconsin, has attempted to do just that with the developments of the past 13 years.* Rather than enumerate the results of the many workers in the field, the author has summarised and digested the material, giving the reader his interpretation of the current mode of thought on contentious matters of the moment.

Food technology is discussed only to the extent that a little knowledge of modern processing is necessary to appreciate food microbiology.

The book is divided into sections devoted to micro-organisms important in food microbiology, the preservation of foods, the spoilage of food, food and enzymes produced by micro-organisms, foods in relation to disease, and food sanitation, control and disease. Part of the last-named section is devoted to enforcement and control agencies in the U.S., the Federal Food, Drug, and Cosmetic Act, the Meat Inspection Act, the Federal Inspection and Grading Service, and the State and Municipal Food Laws.

Some of the recent advances which are of general interest are the utilisation of radiations and antibiotics in the preservation of foodstuffs. Throughout the book the 1957 recommended classification of bacteria is used.

* *Food Microbiology*. By W. C. Frazier. Pp. ix and 472. McGraw-Hill Publishing Co., Ltd., London. £3 10s.

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Manufacturers and the Law

Are You Insured?

By Lord Meston

THE subject of Insurance is of interest not only to householders but to all those engaged in business, trade and industry. It is not necessary for everyone to take out the same type or amount of insurance, for the "cover" required must vary with individual circumstances. Here we propose to deal with the subject of insurance as it concerns traders specially, though many of the matters mentioned will be of general application.

In the first place the trader should be covered for *Fire* (including lightning), to which may be added certain special perils, for example:

explosions, riot and civil commotion;
aircraft and articles dropped therefrom;
water damage;
impact.

This should apply to stock-in-trade, goods in trust, fixtures and fittings and all other contents; also the building if this is owned by the trader or it is his responsibility to insure under the terms of a lease.

Then there are consequential losses resulting from a fire, and it is highly desirable that these should be covered by a policy. Trading losses resulting from the interruption of business are not covered by the ordinary Fire Policy, which insures material loss only, such as damage to buildings and contents.

During the months following a serious fire, sales (and in consequence) profits will almost certainly be reduced whilst many expenses will continue unabated.

Trading losses caused by a fire include:

(a) loss of net profit;

(b) liability for standing charges, such as interest, rent, salaries and wages, advertising contracts, all of which will either have been paid in anticipation of profit to be earned or will require to be paid although the business may be stopped in consequence of a fire;

(c) additional expenditure necessarily incurred in order to carry on the business under the abnormal conditions resulting from a fire, including costs of renting other premises temporarily.

An insurance company cannot be expected to cover the above consequential losses indefinitely, and therefore compensation will be payable after a fire during the time that these consequential losses continue but not exceeding the "Indemnity Period" expressed in the policy. The indemnity period is the period beginning with the occurrence of the damage and not later than (a stated number) months thereafter, during which the results of the business shall be affected, in consequence of the damage. This period should be carefully estimated by the trader, having regard to the length of time likely to elapse before the premises are reinstated and any other factors which may delay a full recovery of earnings.

The next important matter which requires attention is *Burglary and Housebreaking*. Despite protective fittings to doors and windows and the installation of other devices which together make for reasonable adequate security, burglaries still occur. Not only is property stolen but often wilful damage is done to stock, and, in addition, there is the cost of repairing the damage caused at the time of entry. The insurance should cover all contents as under the Fire Policy. In connection with burglary the policy should also cover loss of money and stamped National Insurance Cards whilst in transit and on the premises. Damage by theft to the safe in which the money or cards is contained should also be included.

A very important subject is that of *Employer's Liability*. An employer has a responsibility at law to his employees for injuries sustained at work. The amount of damages awarded by the Courts may be considerable and the costs of litigation are equally heavy. An insurance policy provides that the insurance company will indemnify the insured against liability at law for damages and costs and expenses in respect of bodily injury or disease caused during the period of insurance to any person under a contract of service or apprenticeship with the insured and "arising out of and in the course of his employment" by the insured in the business.

Then there is the equally important subject of *Public Liability*. Accidents to members of the public happening through the fault of employees or through some defect in the premises, ways, works, machinery or plant are not infrequent and often involve the payment of substantial compensation. A policy covering the trader's public liability will indemnify him against claims made by persons not in his service for personal injury or damage to property by accidents occurring at or about his premises or elsewhere if required.

Nowadays it is becoming common to extend this policy to cover a trader's liability arising out of defects in the goods sold. This is called "Products Liability."

We all remember the case of *Donoghue* v. *Stevenson* which was decided some twenty-seven years ago. There was a decomposed snail in an opaque bottle of ginger beer which was sold by a shopkeeper to a customer; the latter was made

ill after drinking the ginger beer (no wonder) and he brought an action for damages against both the retailer (the shopkeeper in question) and the manufacturer. The case went to the House of Lords and eventually it was decided that the manufacturer alone was liable to the customer who drank the beer. Apart from the question of damages, history does not tell us of the enormous legal costs which must have been incurred by the various parties in that case. A policy covering "Products Liability" is therefore worthy of consideration.

There are certain other matters which frequently arise for consideration. One of these is *Glass*. For the display of goods or for the admission of light, the use of glass is a universal necessity. It is possible to take out a policy which covers loss by malicious or accidental breakage (other than by Fire) to all kinds of plate, silvered, ornamented and other glass, Marmorite, artificial marble and the like, lighting globes and fixtures, neon signs, fluorescent tubes, washbasins, splashbacks, and glass or plastic furniture. Such a policy covers the replacement of glass (and the above-mentioned objects which are included in that heading), the labour charges involved and the temporary boarding of windows as a direct consequence of the breakage. It is well to note that such a policy does not normally extend to frames or framework of any description, or to the removal or replacement of any fittings or fixtures in order to replace glass. However, all these items can be included in the policy if requested and agreed.

Claims sometimes arise in connection with the use of motor vehicles, pedal cycles and cycle carriers by the trader or his employees. For example, these claims may relate to loss or damage caused to a member of the public by the loading or unloading of vehicles or carriers. Then there is the ordinary case of where such a vehicle has been damaged in a collision or by fire, or has been stolen. All the eventualities can be covered by a policy of insurance.

The majority of the above insurances can be effected by the completion of one proposal form and the issue of a Combined Policy. The sole object of the above observations is to invite the attention of the trader to a variety of matters which he may wish to discuss with his Insurance Company. And having covered his liability in respect of his business, the trader will not overlook his personal insurance. Those normally essential are comprehensive for his house and contents; All Risks for jewellery, Furs and other valuables; Motor Car; Personal Liability; Personal Accident and Life Assurances.

A formidable array of misfortune to protect oneself against. In practice, however, the annual premium, or premiums, are not so heavy as one might anticipate, and, in any event, they can be the subject of relief from income tax.

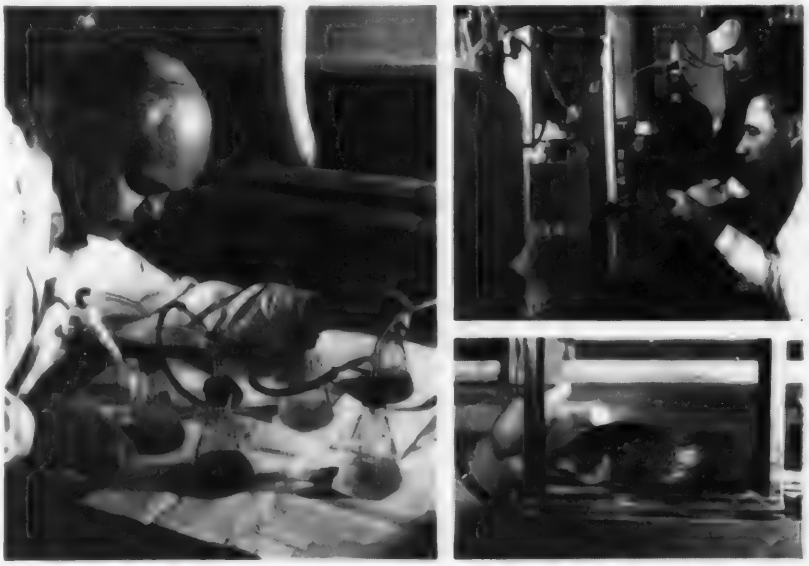
Will Tilapia be Space Travellers' Food?

SCIENTISTS of the Boeing Airplane Co. of the U.S.A. are working on the problem of providing food for the future space traveller. The enormous power needed to lift every pound into space dictates that food and water for space travellers must weigh as little as possible. Most space planning contemplates trips of months and years, and each man will require about 5 lb. of water and 1½ lb. of oxygen per day, in addition to food.

An answer is being sought in a fast, closed natural cycle in which water and human wastes fertilise plants which release oxygen and which feed men, or animals eaten by men, and which also absorb expired carbon dioxide. An edible animal which fits into the picture is *tilapia*, a tropical fish originating in Java which is tasty, grows fast, starts reproducing regularly when eight weeks old, and which can exist entirely on algæ.

Through a contract with the University of Washington College of Fisheries, the Boeing scientists are experimenting with algæ production from human wastes, and trying to learn whether fish growing is practical. Other experiments cover mushroom growing and the

(*Concluded on page* 481)



(*Left*): **A Boeing chemist checks the flow of air through flasks in which algae are growing on purified human waste.** (*Top, right*): **Dr. J. Stern of Boeing (back) and Dr. A. Sparks of University of Washington College of Fisheries watch tilapia, in small jar in centre, feeding on algae grown in large jar on left from human waste and carbon dioxide.** (*Bottom, right*): **A tilapia of the kind used in these experiments.**

Marabou–Findus

Swedish chocolate factory

One of the places visited by the members of the S.C.I. Food Group's Overseas Tour this summer was Marabou's chocolate factory at Sundbyberg, Stockholm, the largest in Scandinavia. Founded in 1916, it has been extended many times, the last in 1957, when a 6-storey building costing 8 million Sw. Cr. was built on an area of 118,400 sq. ft. Marabou also own Findus, one of the biggest frozen food producers in the world. These pictures were brought back by Mr. W. Leonard Hill.

MARABOU, one of the leading chocolate manufacturers in Sweden, was founded on the initiative of a Norwegian chocolate firm, Freia, which had been built up by the managing director, Johan Throne-Holst. In 1916 his son, Henning Throne-Holst, went to Sweden to investigate the possibility of starting a chocolate industry there. A new Swedish company—Marabou—went into operation in 1919 and has been expanding ever since. It is the largest chocolate firm in Scandinavia and employs about 1,000 workers.

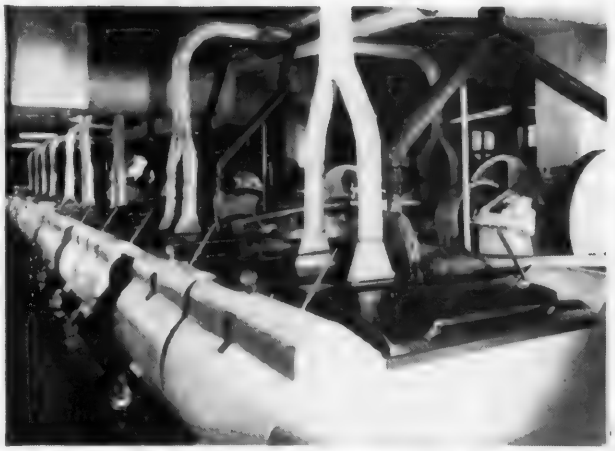
Its annual production has grown from 1,470 tons in 1929 to 13,000 tons in 1958, amounting in value to one-third of the Swedish market. For 20 years a sales tax of 65% of the wholesale price has been levied on confectionery in Sweden; this means that Marabou, which in 1958 had a turnover of 132 million Sw. Cr., pays about 46 million Sw. Cr. in sales tax, which the firm say has reduced consumption and handicapped the development of the Swedish chocolate industry. Chocolate consumption per head in Sweden is only half what it is in Great Britain.

Marabou sells at present about 70 different kinds of sweets and chocolates.

Findus

In 1941 Marabou established a modern canning and frozen food company called Findus near Häl-

Chocolate manufacture at Marabou. (*Left*): The cocoa bean roasting department which handles about 10 tons of beans per shift. The beans are drawn from 4 silos holding 800 tons. (*Right*): After roasting the beans are winnowed and ground. The resulting fluid cocoa mass after mixing with sugar, milk powder and cocoa butter is refined in these 5 roller refiners, which have a capacity of about 15 tons per shift.



(*Left*): These are the conches where chocolate is worked from 2 to 5 days, depending on the kind. There are 24 conches, each holding the equivalent of 35,000 chocolate bars. After being refined the chocolate is ready either for moulding into bars or for enrobing. (*Right*): The bar moulding department. Three moulding machines handle about 7½ tons per shift, equivalent to about 100,000 chocolate bars.

(*Left*): Enrobing of assorted chocolates. Two machines produce 50,000 pieces per hr., which are conveyed along cooling tunnels where the chocolate sets and is ready for packing. (*Right*): The packing department where the packing of assorted chocolates takes place.

singborg in the south of Sweden. Annual Findus production has grown from 300 tons in 1941 to an estimated 30,000 this year. At first, production was concentrated on jams and marmalades, but at the end of the war, Findus began producing frozen foods, baby foods, cake mixes and canned foods as well.

A joint Scandinavian enterprise

The Findus plants have been expanded several times, with the result that they now cover an area of 370,000 sq. ft. Thanks largely to Findus, Sweden has today the largest *per capita* consumption of frozen food in Europe.

In co-operation with the Norwegian company Freia and the Danish company Jalco, Marabou-Findus has founded Findus International, whose policy is to locate factories where raw materials are in good supply and where Findus quality requirements can be met.

The specialisation of each Scandinavian country in different types of foods and excellent natural resources ensures competitive prices. Findus International claims that through constant interchange of technical and research data between the participating companies and joint product development work, it can provide a wide range of frozen foods of highest quality, and that it has already had great success in introducing frozen foods in Great Britain and central Europe.

Will Tilapia be Space Travellers' Food?

(*Concluded from page 479*)

problem of geotropism (effect of gravity on plants which makes the roots grow down and the stems up) in a gravity-free environment. Other problems being investigated are the amount of light needed for plant growth, the effect of radiation on plants, and whether antibiotics could be used to check contaminants which might poison a small closed system.—M. LORANT.

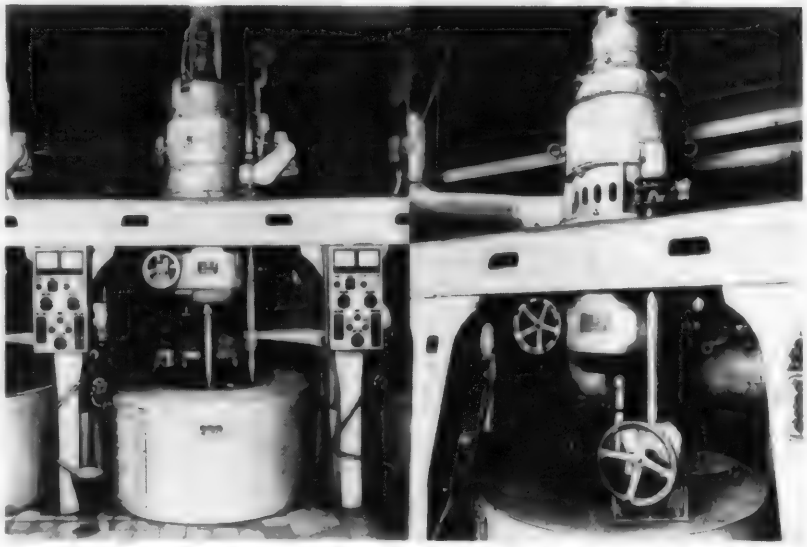
Swedish Fully Automatic Sugar Centrifuges

FOLLOWING several years of technical co-operation between the Swedish Sugar Corporation, which controls Swedish sugar production and imports, and two Swedish engineering firms, a new fully automatic sugar centrifuge and a semi-automatic centrifuge have now been developed in that country, where a number of them are now in commercial operation.

Since the massecuites, which are processed in the sugar industry, greatly differ from one another with regard to purity, the viscosity of the syrup, the size of the sugar crystals, etc., the ease with which the syrup is separated from the sugar crystals also varies. Different types of massecuite have to be centrifuged at different centrifugal forces, these varying from 600 times the force of gravity for refined sugars of the highest degree of purity to 1,500 times the force of gravity for low grade sugars of the lowest degree of purity. The different properties of the massecuites also cause centrifuging to vary. In the case of refined sugar, very little is to be gained in the centrifuging time by raising the centrifugal force from 600 to 1,500 times the force of gravity. With raw sugar, on the other hand, the centrifuging time can be reduced by half, *viz.*, from six to three minutes. The greatest advantage, however, is obtained with low-grade sugars, where there is a gain of 16 minutes.

The thickness of the basket-casing also varies for different centrifugal forces, since the stresses imposed on the basket also differ. Thus, when the highest centrifugal forces are being used, thicker basket-casings are required than for lower centrifugal forces. A basket for low-grade sugar will consequently have a considerably greater moment of inertia than a basket intended exclusively for refined sugar.

Since centrifuging time for refined sugar is much shorter than for raw sugar and still more so than for low-grade sugar, the centrifuge can deal with more charges of refined sugar than of the other two varieties and the number of cycles per hour is thus greatest for refined sugar and least for low-grade sugar.



(*Left*): **A fully-automatic centrifuge for white sugar, with pneumatic loading gate, motor-driven unloader and loading regulator.** (*Right*): **A semi-automatic centrifuge for low-purity massecuites, with slip-ring induction motor and manually-operated unloader.**

Two types

In order to fulfil the requirements for different centrifugal forces and different numbers of cycles per hour, two types of centrifuge have been developed by the Swedish Sugar Corporation in conjunction with ASEA and AB Landsverk. That intended for massecuites of a high degree of purity has a basket speed limited to maximum 1,300 r.p.m., in which case the centrifugal force is about 1,000 times the force of gravity and a high number of cycles per hour is achieved. The basket in the other centrifuge, which is intended for low-grade sugar and is not operated at a large number of cycles per hour, is designed for a maximum speed of 1,500 r.p.m., in which case the centrifugal force will be 1,500 times the force of gravity.

Known as Type C1300-54, the former is a fully automatic unit with a pneumatically operated loading gate and a motor-operated unloader. The time setting devices for centrifuging, washing, and changing over the syrup outlet are grouped in a central station. The 330 litre capacity basket has an internal diameter of 1,200 mm. and a height of 600 mm. The rotating unit, consisting of the basket, spindle, brake drum, coupling, bearings, etc., is balanced statically and dynamically and a damping device and the bearings prevent dangerous oscillations from arising in the centrifugal basket. Lubrication of the bearings is effected by means of an oil-mist apparatus. Constructed of heavy steel plate, the protective casing has a rim, with an internal circular gutter provided with a wooden ring. This is a special safety device by means of which

abnormal deflections of the centrifugal basket are prevented. In the protective casing there is a perforated coil of tubing for discharging steam required for dissolving crystallised sugar.

Usually of open design, the massecuite is generally provided with a heating device and an outlet having two gates. The latter are operated pneumatically, the inner one serving as a closing gate, while the outer one is a drip gate. A stirrer gives more consistency with high purity massecuites. A distributor disc spreads out the massecuite in the basket and can be adjusted axially to deal with different viscosities. Intended for fully automatic service, the unloader is operated by means of an electric motor provided with a brake. This centrifuge can be fitted with a branch pipe controlled by an automatically operated gate which can be set so that the centrifuged sugar is led off either for reprocessing or as a finished product. The latter is consequently only accessible while the sugar is being unloaded from the centrifuge. There is also an automatic device for separating the syrup, thus enabling the green and white syrup to be led off separately. Special washing equipment made of non-corrosive material can be supplied as well as conveying equipment for transporting the finished product.

The centrifuge continues operating from one cycle to another without any manual intervention, the only adjustment required being the resetting of the washing and operating times in conjunction with variations in the consistency of the massecuite.

Cycle of operations

A centrifuging cycle can be divided up into acceleration from unloading to loading speed; loading while the centrifuge operates at constant speed; acceleration from loading to centrifuging speed; operation at full speed; braking from centrifuging to unloading speed; and unloading. During the cycle, washing with one or more media and changing over of the syrup outlet takes place. These operations are also carried out automatically in accordance with a previously set time schedule.

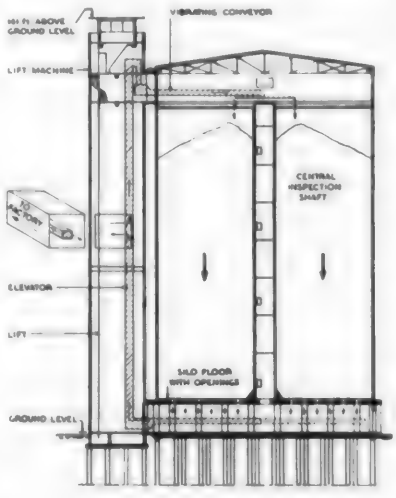
In the case of an automatically operated battery of centrifuges adjustments can be carried out from a central point by means of relays. The Leonard electric drive system is used and this operates at three speeds for loading, centrifuging and unloading which can be kept constant irrespective of the load. The speeds can be adjusted within wide ranges and can be set for different grades of massecuite. The transition between the different fixed speeds takes place with an almost constant torque on the spindle of the centrifuge, and it is possible to alter this torque and thereby the total acceleration and retardation times.

In the case of the semi-automatic C1500-51 centrifuge for massecuites of a low degree of purity the basket has similar dimensions and capacity and the unit has a manually-operated loading gate and unloader. It is driven by a conventional slip-ring motor, rated at 1,460 r.p.m. The basket-bottom cone can be operated either manually or pneumatically, and the feeder is either of open or closed design, provided with heating device and a discharge outlet with gate, which can be operated either by hand or pneumatically. The manually-operated unloader is equipped with a combined electro-mechanical blocking device so that the plough cannot be inserted into the centrifuge basket until the prescribed unloading speed is attained.

The centrifugal basket is loaded and unloaded at the same speed of 50 r.p.m. which is obtained by supplying the direct-connected, slip-ring motor with low-frequency current at 1·33 c/s from a convertor serving the whole centrifugal battery. Braking is effected by supplying direct current to the stator winding in the motor at the same time as the rheostatic starter is connected in. As an alternative, Leonard equipment can be used. —J. GRINDROD.

First Dutch Refined Sugar Silo

CONSTRUCTED by Hollandsche Beton Maatschappij N.V., of The Hague, a new 10,000 metric ton capacity sugar silo and elevator tower has recently been placed in service by Coöp Suikerfabriek en Raffinaderij G.A. "Puttershoek." It is the first silo for refined sugar to be erected in the Netherlands and has been built in order to expand the storage capacity of the company and to meet the growing demand for bulk sugar.



Both the square tower and the cylindrical silo have been constructed by means of a sliding formwork, the wall of the latter being 25 cm. (10 in.) thick. The silo has an inside diameter of 22·5 m. (74 ft.) and a height of 41 m. (134 ft.), while the tower is 5·50 × 5·50 m. (18 × 18 ft.) square internally and has a height of 43 m. (141 ft.). A record speed of erection is claimed for the silo, work being pushed ahead to bring the facility into use as soon as possible, and concrete pouring advanced by as much as 5 m. a day during the initial stages of construction.

Resting on 280 concrete piles the 55 cm. thick foundations support a 60 cm. thick silo floor built on 56 concrete pillars. A central

inspection shaft is incorporated in the silo and overall is an attic.

During the erection of the silo a connecting bridge at a height of 19 m. was constructed between the factory and the silo, spanning 100 ft. This bridge houses the belt conveyor which transports the refined sugar from the factory to the silo.

Remote control

In the tower, two sugar elevators have been installed, one from the basement to the belt conveyor and the other from the belt conveyor to the attic. A lift, a winch and a staircase have also been installed within the tower. Both in the attic and in the basement horizontal vibrating conveyors are used for transporting the sugar, that in the attic being used for charging the silo, while the one in the basement is used for discharging the silo, the sugar, in this case, being fed on to the conveyor through holes in the floor.

Central heating has been installed in the attic of the silo and in the tower to keep the sugar in good condition, while an air conditioning system controls the humidity in both the silo itself and in the rest of the building. Caliqua N.V., of Tilburg, Holland, were responsible for the central heating installation, while Silica-Gel-Gesellschaft, Berlin, were responsible for the air conditioning.

Charging and discharging of the silo is automatically controlled from a central operation room. The sugar factory at Puttershoek has a capacity of 7,500 metric tons of sugar beets daily and came into use last December.—J. GRINDROD.

Automation boosts Italian Biscuit Industry

UNTIL shortly before the second world war each Italian consumed an average of 300 g. of bread daily; today this average has dropped to 250 g. (1 ounce = 28·35 g.). Though many other nations consume far less, the continuing drop in bread consumption in this traditionally bread-eating country is due to the astounding progress made by the biscuit industry.

Dry, or toasted, biscuits alone account for much of the general progress of the industry. In 1936, Italy consumed 16,000 tons of rusks and crackers, 25,000 tons in 1938, 50,000 in 1951, 60,000 in 1953, 70,000 in 1955, 90,000 in 1957, and in 1958 the record of over 100,000 tons.

To these figures must be added the mounting sales of sweet, salted and cheese or cocktail-type biscuits, produced by internationally known firms such as Motta and Allemagna of Milan, by Pavesi at its Novara and Rome plants, by Lazzaroni and Dufour at Genoa. Motta and Pavesi, in addition to their range of rusks and wafers, produce some 40 various types of packed biscuits as well as some rusk types made under licence.

This rapid progress of the rusk and biscuit industry in Italy is due to sweeping industrialisation and increasing automation at plants such as Motta, Allemagna and Pavesi under strictest measures of hygienic control. Mechanisation of production has resulted in a sharp decrease of prices since the end of the war, despite heavy government taxes on salt and sugar consumption, which are both sold under state monopoly.

The former methods of biscuit production throughout Italy, up and until 1930 artisanal, have been brought virtually to a standstill. Until 1930, biscuit manufacture throughout Italy was carried out by local craftsmen, but where formerly there would be several hundred in a city such as Rome, there may now remain a mere dozen, and even these are threatened by the ever expanding production of the large manufacturers.

Until the beginning of the twentieth century, rusks and biscuits were strictly limited by local hand production according to traditional recipes, such as at Venice the "scalette" and "baicoli." Towards the beginning of the century industrial production began with firms such as Digerini and Marinai at Florence and the Lazzaroni plant at Saronno, to be later joined by Saiwa at Genoa, which today has a second plant at Frugarolo (Alessandria). A large number of smaller plants, actively engaged on the national market, entered the field after the war, such as Wamar at Torino, Guglielmone at Mortara, Bovolone at Verona with a sister-plant at Milano, and Delser and Dorio at Udine for the Trieste region.

Principal types of biscuits sold on the (Italian) domestic market are: oblong "osvegho," "petit beurre," and round "marie." Slightly heavier to digest and more fragile are the "frollini." Special popular types are the "amaretti" with egg-yolk and bitter almonds, and the "savoiardi" and wafers with two or three layers of chocolate cream or other flavours.

Biscuits of these types and rusks or crackers have become an integral part of the average Italian's breakfast. They are produced with great care and attractively conditioned. Manufacturers today believe that, within the next five years, Italy will reach the 200,000 ton mark without even coming anywhere near the point of market saturation.—JOHN ASHTON.

Notes for Contributors and Authors

The Editor of FOOD MANUFACTURE welcomes articles, news items and other contributions on all aspects of food production.

The purpose of this journal is to exchange information between all those concerned in the food industry. Articles should therefore be written in a readable style, avoiding esoteric terminology and technical jargon, and should contain factual and practical information.

A preliminary synopsis should, preferably, be sent to the Editor, and the contribution itself should be typed in double spacing on one side of the paper only. It should bear the name and address of the author and should be accompanied by photographs suitable for illustrations.

Advances in Food Technology

ANTIBIOTICS

Microbiological Test

A simple and sufficiently sensitive test for the presumptive detection of antibiotics in foods is based on the principle that the food under investigation is mixed with double-strength agar containing triphenyltetrazolium as an indicator of bacterial growth. The agar dispersion so obtained is streak-inoculated with suitable test strains and incubated, using as a blank a mixture and an identical food sample known to be free from added antibiotics.

For the presumptive determination of antibiotics *Staphylococcus aureus* and *Streptococcus cremis* are used as test organisms. For use in the confirmative and completed tests, the usual selection of test bacteria and strains, which have been rendered resistant to a certain antibiotic, may be used.—L. P. van der Mijll Dekker, D. A. A. Mossel, *et al.*, *J. Sci. Food Agric.*, 1959, **10** (9), 475.

BREAD

Simplified Manufacture

The conventional procedure for making bread has been modified by increasing the speed (in a two-bladed mixer) two to threefold, and by the immediate transfer of the dough from the mixer to the making up machinery, in which the rollers are set as closely as possible.

The composition of the dough needs no modification except for the addition of 1-2% sugar. The quality of the resulting bread is described as being in no way inferior to the quality of ordinary bread.—G. Jongh and C. J. Wensveen, *Bakkerswereld*, 1957-58, **18**, 42.

MEAT PRODUCTS

Cooling Fresh Meat

Efficient preservation of perishables in general and meat in particular is obviously a matter of great importance. An efficient preservation method should preserve the nutritive value, the flavour and natural appearance of the product to the greatest possible extent, and at minimum cost, and should keep shrinkage losses as low as possible.

These conditions are largely met by refrigeration, but the full preservation effect of cooling can only be obtained if the meat is treated and stored in the most suitable way. Research carried out by G. Theireich at the Munich abattoir on the influence of different methods of cooling the meat of freshly killed animals on the weight and bacterial content of the meat shows that quick cooling methods must be regarded as superior to the conventional chilling in normal pre-cooling rooms.—Wagemann, *Die Fleischwirtschaft*, 1959, **11**, 811.

Curing Brines

Research workers at the German Federal Meat Research Institute, Kulmbach, have tried to work out simple and practical methods for the examination of cover and spray-type brines, and to establish criteria for quality assessment.

Among these criteria are the temperature of the brine at the time of sampling, the sodium chloride content, the organoleptical quality, the oxidation-reduction potential, the *p*H value, the nitrite content, the content in bacterial decomposition products, and the bacterial count. On the strength of these investigations, suggestions are formulated for the examination of brines at scientific laboratories, and for a simplified routine examination of brines at plant laboratories not generally equipped with bacteriological testing apparatus.—L. Leistner and A. Mirna, *Die Fleischwirtschaft*, 1959, **11**, 821.

POULTRY

Storage Conditions

The German Federal Research Institute for Food Preservation has carried out experimental research on the cold storage of frozen chicken. Chicken of known and uniform breed and subjected to the same processing, packaged and unpackaged, were kept in cold storage at three different temperatures (−24°C., −18°C., −12°C., and were organoleptically examined at intervals up to one year. Differences were found between the chicken kept at −12°C. and −18°C., but not between those kept at −18°C. and −24°C., though the durability was somewhat greater at the latter temperature. It was found possible to keep packaged chicken in a satisfactory condition for 10 to 12 months at −24°C., 7 to 8 months at −18°C., and 4 to 5 months at −12°C., though it is recommended to keep them, in practice, not longer than 7 to 8 months at −24°C., 5 to 6 months at −18°C., and 3 to 4 months at −12°C. With unpackaged poultry, the keeping time is limited by the change in appearance to much shorter periods. The loss of weight was found to amount to nearly 0·05% per month for packaged poultry, and 1·3% per month for unpackaged poultry.—J. Gutschmidt, *Kältetechnik*, 1959, **11**, 310.

RANCIDITY

Protecting Sweets

Sweets made with jaggery (sugar made from palm sap) and groundnut in equal proportions have been found to keep for a longer time than those made with sugar. Jaggery was found to suppress the formation of peroxide in oxidising oils at a concentration of 10-50% by weight of the oils. Ether extracts, 85% alcohol extracts and tannins of jaggery show the peroxide suppressing effect in various varying extents. The major effect is in the portions insoluble in ether, ethyl alcohol and acetyl ethyl ether.

The addition of citric acid does not enhance the antioxidant effect of jaggery, but antibiotics, such as B.H.A. and Tenox-ll, supplement the action of jaggery. The light petroleum extract of jaggery, however, acts as a prooxidant.—W. B. Date, C. P. Natarajan and R. B. Nair, *Indian J. Appl. Chem.*, 1958, **21**, 165.

DRIED MILK

Reconstitution Qualities

The extent to which dried milk sinks in still water is correlated with the ease of reconstitution. Improved sinking and dispersibility were observed when concentrated to 35% solids and gassed before drying, causing it to foam during drying and dry into thinner films. Further improvement was obtained by heating the dried milk to a temperature above that at which milk fat melts, holding for a short time and cooling rapidly.

The dispersibility of the milk was also enhanced by rapid cooling of the dried milk after it came from the dryer and by not allowing the particles to rub against each other or other objects during chilling. Improved dispersibility obtained by these means is attributed to the arrangement of the free fat on the surface of the particles.

The qualities are retained for 6 months at a temperature of 6°F., but is lost more rapidly with temperature increases until at 32°F. it disappears within 4 hr. Dried whole milk, it was concluded, should be stored and marketed under refrigeration.—D. H. Bullock, *Dissert. Abstr.*, 1959, **19**, 1706.

Machinery and Equipment

DUST CONTROL

At Towcester Mill and Trading Co., Ltd., a Dallow Lambert dust collector unit is used to deal with dust created when grain passes through weighing machines. The collector is the DM 151, made by Dallow, Lambert and Co., Ltd. Grain is stored on the first floor above the weighing machines and is passed through either machine as required. The one on the left of the photograph is arranged for individual bagging of the grain, and that on the right is a continuous batch weigher which passes the grain through the wooden hopper shown, and thence via a conveyor to a storage silo. As the two sets of weighing machines are never in use together the unit dust collector is mobile, on castors, and can be wheeled to whichever machine is in use.

A Dallow Lambert unit dust collector installed in a mill for collecting dust from two machines weighing grain.

LABORATORY MIXER

A new multi-purpose laboratory mixer has been introduced by Silverson Machine (Sales), Ltd., who say that basically the machine consists of a powerful disintegrating centrifugal pattern suction pump enclosed in interchangeable heads and meshes. Rotor blades subject the liquid to a shearing action at high velocity, while the meshes help to produce homogeneous emulsions rapidly.

The machine can handle quantities from 8 fl. oz. to 2 gal. and has a speed of from 200 to 8,000 r.p.m. under load.

Several different heads are available for the mixer: the standard head allows the mix to be sucked in at the bottom and projected in a horizontal plane at high velocity; the axial flow head projects the mix vertically without, it is claimed, aeration of the liquid; the cutting head is intended for use where solid or fibrous material is present; and the pump head may be used for pumping at up to 250 g.p.h.

OIL-FIRED BOILER

A new range of vertical, multi-pass oil-fired boilers, covering steam outputs initially from 1,750 to 8,300 lb./hr. from and at 212°F., has been introduced by Cochran and Co., Annan, Ltd. Known as the Series II, the new boiler is said to embody improved heat transfer surfaces which enable a full load efficiency of over 80% on the gross calorific value of the fuel to be guaranteed under practical operating conditions. This performance is considered to compare very favourably with other modern types of boilers of similar capacities, and introduces entirely new prospects in the use of vertical boilers.

A new Cochran vertical multi-pass oil-fired boiler.

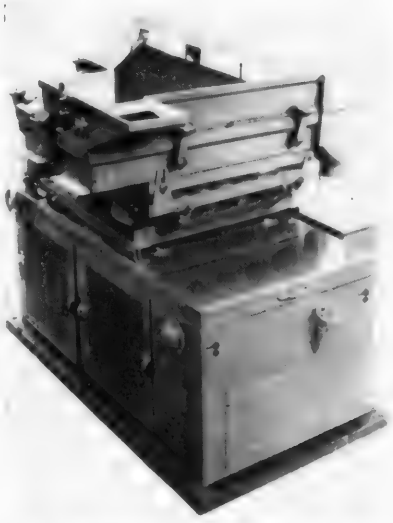
New features which have been incorporated in the model are said to achieve a greater heat transfer than has hitherto been obtained. The smoke tube bank is divided into three passes of small diameter tubes giving a long gas travel at high velocity. The new tube arrangement also increases the surface area. Also, to increase the radiation transfer, the furnace has been enlarged. As well as the new features the boiler has been fitted with a tuned, pressurised jet burner by the Brockhouse Heater Co., Ltd.

A further feature of the boiler is that it can be readily converted to coal-firing. This can be accomplished by removing the division plates between the passes, thus converting the boiler to single-pass operation when it can, if need be, work under natural draught.

The new boiler is said to be as efficient as the horizontal boiler, with the additional advantage of saving floor space and economy of cost.

SEPARATOR

A new machine marketed by Henry Simon, Ltd., is said accurately to separate and classify all granular materials of closely related specific gravity. It is the *Vibragem* blown-air densimetric separator, made by Socam of Paris and introduced to the U.K. by the Simon organisation. It permits simultaneous classification, grading, stone removal and purification. A wide variety of materials can be processed with this machine.



The Vibragem blown-air separator introduced into the U.K. by Henry Simon, Ltd.

The materials under treatment are fed on to a triangular screen which oscillates rapidly. Filtered air is introduced from underneath and holds the materials in suspension over the screen while separation takes place. A second screen of wire gauze is incorporated to give uniform air distribution. Capacity varies according to the specific gravity of the materials and on products handled so far the throughput has varied between 800 lb. and 3,000 lb. an hr.

CONVEYOR-ELEVATOR

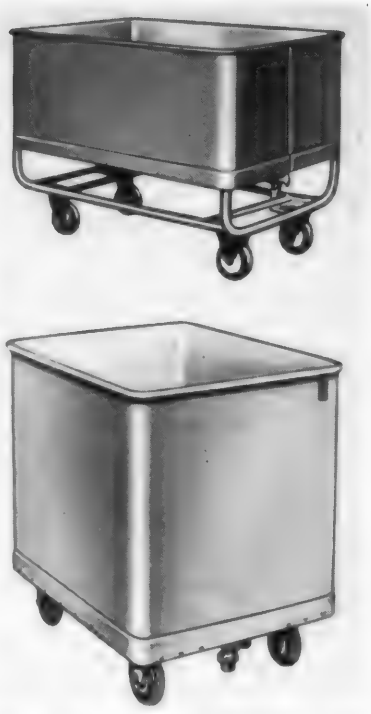
The latest addition to the *ALM* range of portable handling equipment, the *Handiveyor*, has been designed to meet the increasing need for a versatile but inexpensive mobile conveyor, according to the makers, A. L. Marshall (Carlton), Ltd.

Although the incline variation of the conveyor is manual, the boom is said to be evenly balanced, quickly adjustable and easily locked in the desired position by one person. The boom is 13 ft. 5 in. long, has a maximum delivery height of 7 ft. 3 in., will carry a distributed load of 2 cwt. and will also operate as a horizontal conveyor at a height of 3 ft. 3 in.

TROLLEY CONTAINERS

A new range of trolley containers especially designed for the food processing industry has been introduced by Light Alloy Construction, Ltd.

They are fabricated from aluminium alloy which is heat hardened after forming, resulting in a tough hard surface that is as clean to handle as glass, and, it is stated, will positively not "mark off." It can be sterilised under high temperatures without harming the surface. These trolleys are about half the weight of steel, and



Two of the range of aluminium alloy trolley containers designed for food processing by Light Alloy Construction, Ltd.

their cost less than that of stainless steel. They are mounted on a non-corrodible lightweight chassis, fitted with tapered bearing castors. The container is all welded and completely liquid tight.

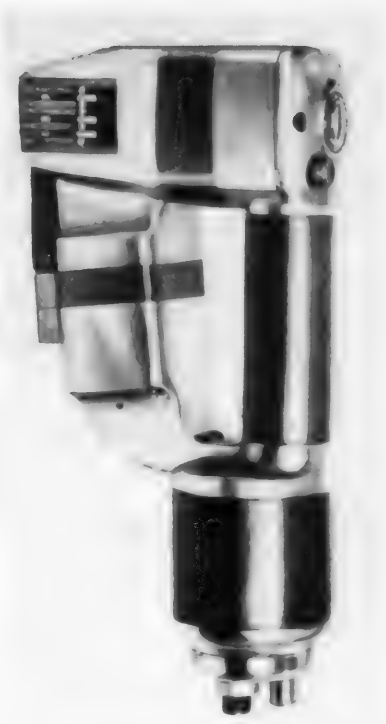
A draining tap at the base facilitates emptying and cleaning out of the container. It can also be fitted with a loose diaphragm plate to keep the contents free from contact with draining water and other fluids.

VACUUM PACKER

Felber, Jucker and Co., Ltd., have introduced to this country a new vacuum sealing machine known as the *Swissvac* made by Schoenenberger and Co., A.G., of Zurich.

Sealing is by impulse on both the top and bottom bars, and the amount of pressure may be regulated from 1-180 kilos. Feed is by belt, powered by a ¼ h.p. motor, and the speed of the belt can be varied to match the speed of the production line. Two pointers on a dial on the control panel allow the user to select the degree of vacuum required and, where gas packing is being used, to vary the amount of gas inserted into the pouch. If required the angle of the vacuum chamber and the conveyor belt may be adjusted to 40% to enable the machine to accommodate liquid products.

The number of packs produced per min. varies according to size, but it is



"Straplicator" strapping tool

stated that a bacon packer using a pouch 5½ in. × 10 in. could pack 36 per min.

The machine has a safety device which should any part of the operator's body be caught in the machine while the lid is closing, a cut-out coming into operation immediately. All movements of the machine are controlled by an electronic timer situated beneath the control panel.

STRAPPING TOOL

Packers Supply Co., Ltd., have introduced a hand strapping tool, called the *Straplicator*, which works off any standard airline or small compressor, depending for its working on a combination of pneumatics and hydraulics. Tension may be predetermined by the setting of a calibrated dial and this predetermined tension remains the same until such time as it is re-set.

In operation the button is pressed and the machine tensions the strapping to the required tension following on with the sealing operation and finally cutting off the surplus strapping close to the seal. The whole operation, from feed to cut-off, takes three to four seconds and, it is claimed, at the same time an immensely strong and secure sealed joint is formed.

The tool weighs in the region of 7 lb. and measures 11 in. × 5½ in. × 2¾ in. and can be supplied for use with ½ in., ⅝ in. and ¾ in. width strapping on a wide range of gauges.

News Digest

Birds open new Research Labs in Birmingham

The new £120,000 research block in Warwick Street, Birmingham, for Alfred Bird and Sons, Ltd., was opened by Viscountess Lewisham on November 10. Under the management of Mr. W. H. Davies, a staff of 30 chemists, chemical engineers and assistants will work on the development of new and more convenient lines for the British housewife.

In 1947, Birds were taken over by the General Foods Corporation of the U.S.A. "Thank God for this," said Mr. Davies at the luncheon which followed the opening; "if that take-over had not happened I would not be standing here today." Now that the laboratories are in full swing, the company is no longer dependent to any extent on the research of the American company, the results of which in any case had to be modified to suit the different tastes of the British market.

One of Birds' leading lines is, of course, Maxwell House coffee, and part of the well-equipped pilot plant of the new block is devoted to improving coffee processing. One question in the minds of many of the guests—are Birds developing instant tea?—produced, understandably, no reply. "We have no Swiss connections," was the uninformative comment of the American Managing Director, Mr. Towner M. Smith, amid laughter.

Before the official opening we were taken on a tour of the laboratories,

which occupy two stories and are completely air conditioned. On the ground floor are the beverage and savoury laboratories, analytical laboratory, instrument and dark rooms, and on the first floor, the dessert laboratory, experimental kitchen and a well-stocked library, in which we were pleased to see FOOD MANUFACTURE prominently displayed. Attached to the front is a high single-storey building housing the pilot plant and a raw materials store, which has a precast concrete roof which can be removed in the event of future expansion.

In her speech at the luncheon at the Queen's Hotel, Viscountess Lewisham said that cleanliness in the handling and distribution of food was of paramount importance, and that British laws still did not go far enough in ensuring that food reaches the public in a completely safe and uncontaminated state.

Lobsters' 1,500-mile flight

A telephone call from Stromness, Orkney, to Finisterre in France on October 20 confirmed the successful completion of a venture which, it is hoped, will bring fresh prosperity to Orcadian fishermen. For the first time a batch of Orkney prime lobsters—regarded as the finest in Britain—were exported direct to the Continent by chartered aircraft, which made a round trip of 1,500 miles from Rotterdam to convey 3 tons of lobsters to Finisterre.

The dispatch was arranged by the Orkney Fishermen's Society, a co-operative profit-sharing body formed 5 years ago. The pilot consignment arrived in excellent condition. The society are delighted at the experiment's success, and are hopeful that the popularity of the lobsters will lead to other markets on the Continent.

Previously the entire lobster catch was sent to Billingsgate. Bigger profits for local fishermen are expected from this direct contact with buyers abroad.

Animal feed mills

The British Extracting Co., Ltd., together with the Unilever group, is building 2 compound mills, one at Port Sunlight and the other near Avonmouth for the manufacture of animal feedingstuffs. The mills, which are basically similar in design, will cost over £2 million each. Work has already begun at Port Sunlight, and the mill is due to be completed in the autumn of 1961 and the other 6 months later. An existing mill alongside the Port Sunlight site will be turned into a warehouse.

The new mill will be able to produce ½ million tons annually, and will be equipped to cope with the 100 different types of feed which the British Extracting Co. make and with the short production runs entailed. The mill will be highly mechanised with about £20,000 of capital for each of the 200 operatives to be employed.

It is expected to increase production by about 25% in relation to the capacity of the existing mills.

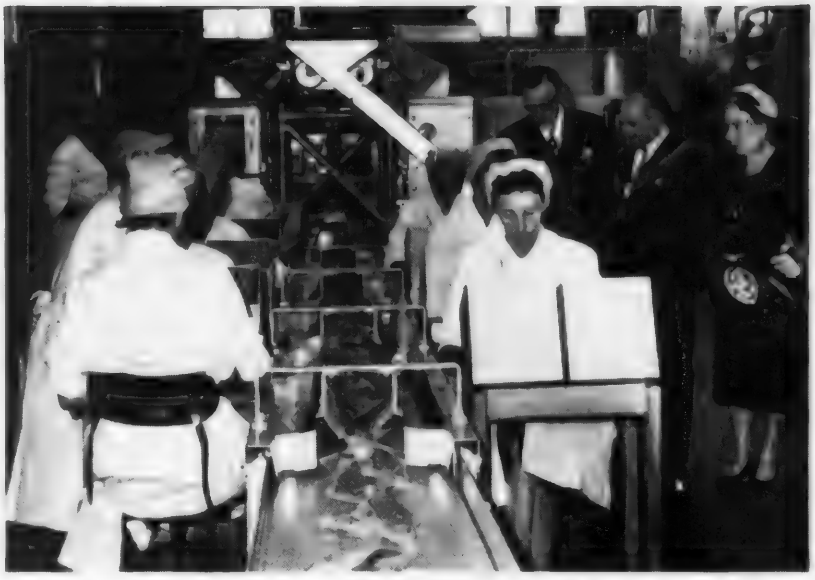
Addendum

To the list of Suppliers of Equipment to James Pascall, Ltd., on p. 379 of the October issue should be added Wm. Brierley, Collier and Hartley, Ltd., who have supplied pulling machines, hot and cold plates, high pressure coil pan, fruit pulping and sieving machine, nougat mixer, drop rollers, toffee cutters and dipping pans.

Plymouth potato crisps factory

The 17th Smith's Potato Crisps factory was opened recently in Ernesettle, a suburb of Plymouth. The factory has two production lines giving a capacity of 360,000 packets of crisps a week, but work has already begun on a third line which should be completed by the beginning of next year.

The Lord Mayor and Lady Mayor of Plymouth were among the guests who were received by Mrs. F. Smith, wife of the late founder of Smith's, and Mr. C. J. Scott, managing director. Other guests included Miss Joan Vickers (M.P. for Devonport) and representatives of the Plymouth Licensed Victuallers Association.



The Lord and Lady Mayoress of Plymouth, Mr. and Mrs. P. N. Washbourn, being shown round the new Plymouth factory of Smith's Potato Crisps, Ltd., by Mr. C. J. Scott, managing director of Smith's.

Food in Parliament

That popular food—the meat pie—is undergoing an exhaustive, official inquiry.

Just how exhaustive M.P.s learned when the subject was spotlighted at Westminster.

Concern was expressed about a certain disparity in the contents of meat pies, and the need to ensure reasonable standards in the interests of consumers was stressed. For the Government it was stated that the whole matter had been referred to the Food Standards Committee. They in turn were approaching local authorities to get detailed facts about the types, composition, labelling and price of pies at present being sold to the public.

When will the Food Standards Committee report? The Agriculture Minister, Mr. John Hare, was unable to give any estimate. "You know what a complicated subject the composition of meat pies is—it is almost as complicated as the composition of the sausage," he observed.

More news about meat and, in particular, the project for an official Meat Research Institute.

A small temporary station is being established near Cambridge to expand work on meat research already being done at the Low Temperature Research Station and elsewhere. The new unit is expected to be in operation at the end of next year. In the meantime, the Agricultural Research Council is thrashing out the wider issues raised by the plan put forward to set up a permanent centre for meat research in Britain.

Problem facing the fishing industry—how to give dehydrated fish a palatable appearance.

There is a great future for dehydration, but apparently people are put off by the look of the fish. Which is a pity, because if you only know how to cook it the fish is very good, according to one woman M.P., Lady Tweedsmuir, who hails from the fishing centre of Aberdeen, where a good deal of research on this subject is being carried on.

Lady Tweedsmuir made the point that much could be done to develop dehydrated fish commercially in Britain but unfortunately America had got in with development first.

Any day now hungry M.P.s may see on their menus—"Today's Special—Black Pudding à la Westminster." If they do it will mean that the plea of Mr. Cyril Bence (Labour, Dunbartonshire, E.) has been answered. He complained in the House one night: "Black puddings seem to be out of fashion. I have never seen any in the House of Commons."

Bronze Age Food

Food excavated by the British School of Archeology in Jerusalem, from a tomb in the world's oldest town, ancient Jericho, and estimated to be 4,000 years old, has been handed over to the Food Research Association, Leatherhead, Surrey, for investigation. As the foods have been subjected to normal atmospheric conditions in the tomb, the scientists are anxious to find out what has caused them to be in such a surprising state of preservation. The picture shows, on the left, meat which when it was found, was still attached to bone, in the centre is what is thought by archeologists to be some form of cereal. The substance on the right is thought to be bread.

Corn oil distributors

Brown and Polson, Ltd., have announced that they are now distributing *Mazola* corn oil nationally. It is stated that the product does not smoke at normal frying temperatures, which means that smoke-free frying is possible. According to Brown and Polson, excess fat is sealed out and the flavour of the food is sealed in.

It is also said to be bland in flavour and free from the objectionable taste associated with some other oils. Medical research is showing that corn oil may have specific advantages over other fats in the control of certain heart conditions.

OBITER DICTA

● The test of a woman is her approach to oysters.—*Peter Simple, Daily Telegraph.*

● Please let me in closing ask that you look into your supermarkets and see what is happening to your product when it hits the consumer.—*American Meat Institute session speaker.*

● You know what a complicated subject the composition of a pie is. It is almost as complicated as that of a sausage.—*Mr. John Hare, Minister of Agriculture, Fisheries and Food.*

● It's very different there (in U.S.A.)—they go in for such bizarre concoctions as the "Awful-Awful," a dollar's worth of ice cream in a huge tulip glass, each scoop covered with a different sauce.—*Press handout.*

● Spaghetti, noodles and ravioli are considered interesting, progressive and enterprising. Long spaghetti are considered exotic, better class, "right for young people." Pasta conveys an image of Italian sunshine and good eating.—*Press handout.*

● Please do not let it be forgotten that these vegetables are ultimately intended to be eaten. Although all the other factors in their growth and management are important, please spare a thought for their taste.—*H.R.H. Prince Philip.*

● Lord Woolton was at his happiest applying the technique of an unusual business man to stocking the nation's larder. An Argentine Ambassador finds him a shrewd eccentric bargainer over meat and an Egytian sugar king melts at his touch.—*Book Review, The Times.*

● The Hanson White Publishing Co., Ltd., are the first firm, so far as I am aware, in this country to supply greeting card envelopes with peppermint flavoured flaps, a feature many objectors to normal gum "flavouring" have been asking for for many years.—*National Newsagent Bookseller Stationer.*

● A soup sold as "Shark's Fin Soup" was stated to be prepared from "chicken, gelatine, fish; flavoured with soy extract, yeast extract, onions, carrots, spices, herbs, monosodium glutamate, garnished with Shark's Fin and parsley." The main constituent was gelatine.—*Chelsea public analyst's report.*

Built by Mann Egerton and Co., Ltd., and fitted with a Thermo King refrigeration unit, this 25 ft. semi-trailer is the first vehicle of its kind so fitted operating in Britain today. The 10/11 ton semi-trailer has a storage capacity of approximately 1,000 cu. ft., the increased payload being made possible, it is claimed, by using the refrigeration unit which fits on the front of the container, instead of the interior of the compartment. The unit is said to be compact, operated by a petrol engine or electric motor (changeable from one to the other by means of one switch) and fully automatic. Trunking in the container ensures that cold air is evenly distributed over the whole length of the body. The temperature may be reduced to −20°F. and refrigeration is by forced convection.

Liquid CO_2 refrigeration

A new process may mean that perishable foodstuffs, such as fish, meat and game, can be delivered from the Highlands to London and the south in a much fresher condition than has been possible hitherto. The Distillers Company, Ltd., British Railways, and a frozen foods company have co-operated in an experiment with the new method, perfected by D.C.L., which employs liquid carbon dioxide. This is a variant of dry ice, which has been used as a preservative until now. It is claimed that the new process is 100% more efficient.

The demonstration was arranged at the premises of Moray Firth Foods, Ltd., Bunchrew, near Inverness. A consignment of scampi was loaded on a B.R. container for transport to the West Kent cold store, where they will be kept for distribution to wholesalers in the London area. The scampi were sprayed with liquid carbon dioxide from a road tanker sent north by D.C.L.

Within seconds their temperature was reduced to −5°F., as compared with 15°F. under the old method. It was stated that the scampi would keep indefinitely at this temperature with ordinary refrigeration.

Slaughterhouse regulations

A statutory form of slaughterhouse licence and of application for a licence is to be brought into use from January 1 next. Until now, there has been no standard form throughout the country either for application to a local authority, or of the licence itself. This has meant that, in some areas, the licence has not clearly defined the extent of the premises or land to which it relates.

Regulations made last year have paved the way for improved standards of hygiene and humane treatment of animals in slaughterhouses, and it is important that there should be no doubt about identifying the premises to which they apply. The new forms are designed to provide clear identification, without putting an undue burden on the applicant in providing the particulars. Copies of the licences will be kept by local authorities as a record which will be open to public inspection.

United Glass rename h.o.

A link with old London has been forged by the renaming of the head office of United Glass, Ltd., in Leicester Street, London.

The 9-storey building which overlooks Leicester Square is now called Leicester House. It stands near the site of the former Leicester House built between 1632 and 1636 by Robert Sidney, Earl of Leicester, and which represented the first development of Leicester Fields, later Leicester Square. The old Leicester House became the home of royalty and later a museum of natural history. It was pulled down after being disposed of in a guinea-a-ticket lottery.

United Glass have had their headquarters in the new Leicester House since 1938.

Mr. C. L. Rowe

Mr. L. C. Haines

Mr. R. A. S. Lacey

Mr. L. H. Meyer

Mr. J. Pickthall

Mr. L. Smith

PEOPLE

MR. C. L. ROWE has retired after being managing director of Libby, McNeill and Libby, Ltd., for 12 years. Born in Toledo, Ohio, Mr. Rowe has spent most of his life in the U.K.

MR. L. C. HAINES, a director since 1938, succeeds Mr. Rowe as managing director. He joined the firm in 1924 at their head office in Chicago.

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The Minister of Agriculture, Fisheries and Food has appointed MR. G. F. A. BURGESS and MR. L. W. PHILLIPS, C.B.E., as part-time members of the Sugar Board. He has also reappointed MR. F. E. HARMER, C.M.G., as a part-time member for a further term.

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MR. JAMES PULLEN, secretary and sales manager of Energen Foods Co., Ltd., has been appointed a director.

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MR. G. J. HOLLIDAY has been appointed to the newly created position of sales supervisor for the Greater London area by John and E. Sturge, Ltd., and will deal mainly with the food, soft drinks and pharmaceutical industries.

MR. L. R. TOMLINSON has joined the company from Allied Colloids, Ltd., as a technical sales representative.

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MR. C. W. E. COLLINS has been appointed managing director and MR. P. N. FLETCHER sales director of Lever's Feeds, Ltd.

Mr. Collins joined Unilever in 1928. In 1952 he was appointed sales manager for Lever's Feeds, Ltd., in Southern England, and in 1957 was made a director.

Mr. Fletcher joined Unilever in 1934. He became a director of Lever's Feeds, Ltd., in 1957.

Among other new appointments are those of MR. D. A. DOUGLAS as general sales manager, MR. K. V. LIVESEY as southern area sales manager and MR. R. H. GRIMES as advertising manager.

MR. S. R. MANSFIELD has been appointed chairman and joint managing director and MR. K. BOHEMEN deputy chairman and joint managing director of Polak and Schwarz (England), Ltd. In addition, MR. J. PICKTHALL, F.R.I.C., and MR. R. A. S. LACEY, A.R.I.C., have been appointed directors.

Mr. Pickthall, who joined the company in 1947, is chief chemist and perfumer and an author and lecturer. He is a past President of the Society of Cosmetic Chemists of Great Britain.

Mr. Lacey joined the company in 1948 and has been in charge of development work connected with the company's activities.

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DR. W. G. SENIOR, Chief Dental Officer at the Ministry of Health, has been formally installed as chairman of the Royal Society for Health for 1959-60.

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MR. G. T. F. ROYLE, the managing director of Mono Containers, Ltd., has retired after 33 years' service with the company.

MR. L. I. BAXTER, A.C.A., who joined Mono Containers in 1932, has been appointed managing director.

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MR. S. SUTHERLAND SMITH, retail marketing manager of Mac Fisheries, Ltd., has joined the Buxted Chicken Co. as marketing director. He joined Unilever as a management trainee in 1946, being seconded to Mac Fisheries, where he had further training in shop management, and later as manager of a group of branches, before being made responsible for advertising, merchandising, shop design and development for the whole of Mac Fisheries organisation.

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MR. D. H. C. JEFFERSON and MR. J. T. SWIFT have been appointed directors of Three Cooks, Ltd.

Mr. Jefferson, who joined the firm in 1947 as a management trainee, was appointed works manager in 1954. He serves on the packaging sub-committee of the Food Manufacturers' Federation and various British Standard Institute committees.

Mr. Swift joined the firm in 1947 as sales manager.

MR. L. H. MEYER, M.INST.R., has joined the refrigeration division of U.D. Engineering Co., Ltd. He has specialised in flow refrigerating processes, and his function in this new appointment will be to co-ordinate the design experience of the refrigeration and conveyor divisions of UDEC in the development of mechanised quick freezing plants, ice cream hardening tunnels, and cooling and drying conveyors for food and chemical plants.

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MR. JOHN R. HOBDAY has been appointed Birmingham area branch manager by Peerless and Ericsson, Ltd.

After spending a short time on the sales staff of a plastics manufacturing company, Mr. Hobday joined Peerless and Ericsson in 1954 as a trainee sales representative. He underwent six months' training, and has since represented the company in London, Lancashire and Staffordshire.

Obituary

The death occurred on October 16 of MR. ARCHIBALD J. STOCKWELL, joint managing director of Rayner and Co., Ltd. He was educated at Whitgift School and joined the firm in 1918. Ten years later he became joint managing director with his brother, Mr. Leo. H. Stockwell, the present chairman. Mr. A. J. Stockwell served on several committees of the Food Manufacturers' Federation during and after the war. He retired from the business just before his death.

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The death occurred on October 28 of MR. LIONEL SMITH, commercial director of Benjamin Electric, Ltd., at the age of 56. He entered the service of the company in 1925 as sales engineer, later becoming manager of the sales department, then personal assistant to the late Mr. Guy Campbell, and eventually was elected to the board in 1938 as commercial director.

He was a member of the E.L.F.A. Council. A keen yachtsman, he was a member of both the Royal Thames Yacht Club and the Royal Ocean Racing Club, and took part in many races.

Food News Overseas

World sardine meeting a success

The World Scientific Meeting in Rome on the Biology of Sardines (see April, p. 142) has now been held, and its final report has been issued.

The meeting, convened by F.A.O., was attended by more than 50 specialists from 26 countries, and some 60 papers were presented. It was a "universal success," said the delegates, in a resolution thanking F.A.O. for convening and running the meeting.

The nine general recommendations of the meeting call for F.A.O. leadership in dealing with international sardine problems. Specifically F.A.O. was asked to publish an annotated bibliography on sardine research and a directory of sardine research institutions, and to strengthen the work of producing synopses on species of sardines and other fishes of economic value.

The meeting also called on F.A.O. to convene "follow-up meetings on the biology of sardines" and on other species "for which major fisheries exist," promote standardisation of routine methods used in research programmes, encourage exchange visits between scientists and focus attention on the need to improve specialised research on sardines.

Dutch grain plant

Machinefabriek Brabant, D. van Opstal N.V., Zevenbergen, Holland, has received an order for the supply of a complete equipment for a grain transhipment plant to be erected at Amsterdam. The order is valued at about £900,00.

In view of this order, the factory specialising in machinery and plant for processing cereals and flour will have to extend its works and increase its staff from 300 to about 500.

Australian subsidiary

Mono Pumps, Ltd., have established a new company known as Mono Pumps (Australia) Pty., Ltd., to foster business interests throughout Australasia.

The chairman of this new Australian subsidiary is Sir Giles Chippindall, G.B.E., who has filled many administrative posts in the Government of Australia. An Australian by birth, Sir Giles Chippindall has, in recent years, extended his valuable services to many directorships in important Australian companies, including that of vice-chairman to the Trans-Australian Airlines. The managing director is G. H. Snow, who established the first branch office in Australia.

Immediate services for the Australian market are provided by the pump assembly works and head offices at Burwood, Melbourne, with similar facilities at Sydney.

Cocoa crop forecasts

The Statistical Committee of the FAO Cocoa Study Group has made the following forecasts of world cocoa production for 1959-60 and of world cocoa grindings for 1960, together with the revised figures for the two previous years.

World production of cocoa beans for 1959-60 is estimated at 898,000 metric tons. This is 17,000 tons more than the revised estimate of 881,000 for 1958-59 and 132,000 tons more than the revised estimates for 1957-58.

Crops in Africa were generally better than last year, except for Nigeria, where the present figure of 125,000 tons is below last year's all-time record crop of 142,400 tons.

For Ghana the main crop is estimated at 255,000 tons, compared with 230,000 for 1958-59. The minor crop starting next spring is estimated at 15,000 tons, compared with the record production of 30,000 tons last year. The total production for Ghana is estimated at 270,000 tons, which is 10,000 tons more than the revised estimate for 1958-59 and 60,000 tons more than in 1957-58.

For Brazil, the committee estimated total production at 170,000 tons, compared with 163,000 tons in 1958-59. In view of the fact that the important temporao crop runs between May and September of 1960, the committee included a figure based on the average of recent years.

The committee estimated world grindings of raw cocoa beans in 1960 at 841,000 tons. This was 26,000 tons more than the revised estimate of 815,000 for 1959, and 23,000 tons more than the revised estimate for 1958.

The decline in prices in 1959 is expected to arrest the fall in consumption and to stimulate some increases in 1960. The sharply lower grinding figures for some of the major consuming countries were not due entirely to lower consumption of chocolate products, but were related in part to higher imports of semi-processed cocoa products as, for instance, in the United States and in the United Kingdom.

"I'll take five hundred of these."

Sicilian orange juice plant

As a result of Netherlands-Italian co-operation, the Naarden-Speda factory at Catania (Sicily) is now in production. This plant is equipped for the extraction and concentration of orange juice for use in the soft drinks industry. Production is under the control of the N.V. Chemische Fabriek Naarden, who have sent their experts to Catania.

This new source of production will enable the requirements of the Dutch juice processing industry to be met within the framework of the European Common Market. The first consignments from the new crop are expected to arrive in Holland shortly.

New Zealand coffee plant

The Nestlé Co. has decided to build its own plant in New Zealand. Because of import restrictions, *Nescafé* has been off the market in New Zealand, and in recent months a new brand of soluble coffee made in North Island has been marketed in co-operation with a local co-operative dairy.

Nestlés hope to recapture the market, and plan to have their plant ready within 18 months. The new factory will cost about £350,000, and about nine-tenths of that will be spent in New Zealand.

A site has not yet been selected.

While final plans are being approved, the government has given a concession to Nestlés for the import of bulk supplies of *Nescafé*, to be packed in Auckland.

Packaging

Disposable beakers made from a new British Resin Products heat-resistant polystyrene by Mono Containers, Ltd., are claimed to impart no taste whatever to beverages.

Plastic disposable beakers

Disposable thin-walled polystyrene beakers, stated to be hygienic, non-toxic and to impart no taste, are now being manufactured by Mono Containers, Ltd.

These beakers or cups are moulded in *Styron* 440 polystyrene, a new high impact material for which outstanding heat resistance is claimed. They are made by a special vacuum-forming process said to ensure a continuous output and unvarying quality.

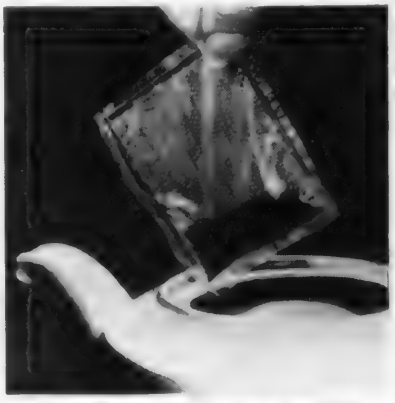
A beaker holds 7, 8, 10 or 12 oz., and the upper central portion is ridged round the circumference to minimise discomfort to the fingers when a hot liquid is being drunk. A moulded-in roll lip makes for improved comfort in the mouth and increases the beaker's rigidity.

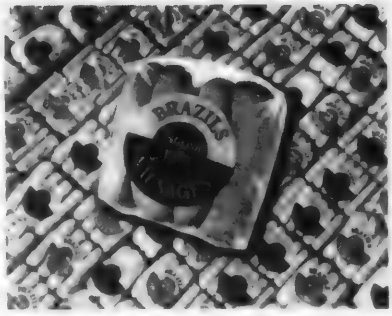
According to the makers, plastics beakers, unlike the waxed paper types, impart no taste whatever to a drink.

Dairy ice cream wrap

J. Lyons and Co., Ltd., have adopted an aluminium foil wrap for their Lyons Maid Dairy Bar. The foil, made by Venesta, Ltd., comprises 0.009 mm. aluminium film laminated to 13½ lb. double crown tissue, and is supplied in reels 5⅞ in. wide embossed medium pinhead.

The foil is fed to a double end fold machine which produces wrapped pieces of ice cream at the rate of 11,000 per hr.





Two uses for the Ventoplas Co.'s ventilated polythene are tea bags (*top*) and sausage wrappings (*bottom*).

Controlled ventilation polythene

Polythene which is ventilated by holes so minute that the material is claimed to prevent shrinkage, preserve the appearance of food, keep it safe from insect contamination, even when it reaches unrefrigerated display in the shops, is marketed by the Ventoplas Co.

In the wrapping of bacon, the use of *Ventoplas*, as the material is called, has been shown in an experiment in which wrapped and unwrapped bacon were placed in a container holding *Lucilia sericata* maggots to prevent the penetration of the maggots into the wrapped piece. Weight losses can also be controlled by use of this material, according to the makers.

The makers also claim that their material is the cheapest for wrapping sausages.

A potential use which is said to have attracted much attention in the tea trade is for tea bags. The polythene is stated to be inert and does not affect the flavour of the brew, which, the makers say, is a main disadvantage of filter papers now being used.

These sweet jar lids, moulded by Ranton and Co., Ltd., from Rigidex polythene supplied by British Resin Products, are claimed to be unbreakable, and are available in four colours.

Sweet jar lids

What are claimed to be unbreakable sweet jar lids are now being moulded in *Rigidex* polythene by Ranton and Co., Ltd. At the moment they are being made in 4 in. size only. The colours available are black, red, blue and amber.

The polythene is supplied by British Resin Products, Ltd.

Tea sachets

Sachet-packed tea is now available in a series of which "pots for 1 and 2" are already being supplied by Stephen Carwardine, Ltd., of Bristol.

Advantages of the system are said to include less waste, through using exact quantities, and easy pouring from the tear-open pack.

The new sachets are made from material designed and supplied by the Robinson Waxed Paper Co., Ltd. It is a special glassine, treated with a proprietary *Lustralac* heat-sealing plastic coating.

The sachets, which are filled and heat-sealed on three edges on an automatic machine, are supplied in reel form and printed in 2-colours by the *Densatone* process, with a simple grid design using distinguishing colours for the different measures of tea.

Trade Marks

BAKA.—B784,253. Vegetable preserves, fruit preserves, vegetable juices and fruit pulp. **Baka Canned Goods Factory, Ltd.,** 10, Ten Mills Road, Ramath Hachayal, Israel.

GEL.—783,747. Quick frozen pastry. **G. E. Leatherland, Ltd.,** 20 and 22, St. Andrew's Street, Newcastle-upon-Tyne.

VITARICE.—784,747. Rice for sale in the U.K. and for export other than to Northern Rhodesia. **White Tomkins and Courage, Ltd.,** 48, Mark Lane, London, E.C.3.

KRAFT MIRACLE.—776,423. Cheese, preparations made principally of cheese for food for human consumption, Welsh rarebit, salad cream, mayonnaise, horseradish cream, sandwich spread made principally of gherkins, salad dressing and margarine. **Kraft Foods, Ltd.,** Morris House, Berkeley Square, London, W.1.

SALAD DAYS.—784,356. Salad oil. **Leon Frenkel, Ltd.,** 28a, Basinghall Street, London, E.C.2.

KRAFT CHEESE SNAKS.—785,232. Cheese; preparations consisting mainly of cheese; and preparations included in Class 29 flavoured with cheese. **Kraft Foods, Ltd.,** Morris House, Berkeley Square, London, W.1.

UNIBRESSE.—B788,617. Cheese. **French Dairy Farmers, Ltd.,** 299, Fulham Road, London, S.W.10.

GOORMETA.—790,870. All goods included in Class 29. **Distrifoods, Ltd.,** 7a, Duke Hill Street, London, S.E.1.

PREFECT.—791,069. Milk. **Co-operative Wholesale Society, Ltd.,** 1, Balloon Street, Manchester.

HYPEL.—791,411. Margarine, butter, edible lard, shortening fats, and animal fats and vegetable fats and mixtures of animal fats and vegetable fats, all being substances for use as food. **August Pellerin, Ltd.,** "Le Dansk Factory," 15, Princes Street, Northam, Southampton.

PORTIA.—791,747. Canned fruits and vegetables. **Eastern Counties Preserves (1940), Ltd.,** Bridge Road, Long Sutton, Spalding, Lincs.

TWIN MAID.—B783,031. Ice cream, ice cream confections and water ices. **J. Lyons and Co., Ltd.,** Cadby Hall, London, W.14.

GOLD MEAD.—B787,778. Biscuits (other than biscuits for animals). **Frears, Ltd.,** Woodgate, Leicester.

CHOC-O-TEENS.—786,654. Chocolate, chocolates and non-medicated confectionery consisting of or containing chocolate. **H. S. Whiteside and Co., Ltd.,** Parkhouse Works, Parkhouse Street, London, S.E.5.

JACKO.—789,729. Biscuits (other than biscuits for animals), chocolate, chocolates and non-medicated confectionery. **Cadbury Brothers, Ltd.,** Bournville, Birmingham.

KIDDY STICKS.—B790,208. Chocolate, chocolates and non-medicated confectionery. **W. and M. Duncan, Ltd.,** 27, Beaverhall Road, Edinburgh.

CAFOLIN.—790,783. Coffee, coffee essence, coffee extract, chicory and preparations of coffee and chicory. **The Cafolin Co., Ltd.,** 20, Eastcheap, London, E.C.3.

CUCKOO.—791,238. Ice cream, ice cream confections, mixtures for use in making ice cream and water ices. **J. Lyons and Co., Ltd.,** Cadby Hall, London, W.14.

NICWIT.—790,825. Non-medicated chocolate confectionery and cocoa products for food. **Chocoladefabriek Nicolaas Wit N.V.,** 72, Lagedijt, Zaandijk, Netherlands.

LINDA.—791,245. Tea in packets. **Brash Brothers (Tea), Ltd.,** 13 Rood Lane, London, E.C.3.

JUMBO.—786,434. Nuts included in Class 29. **H. S. Whiteside and Co., Ltd.,** Parkhouse Works, Parkhouse Street, London, S.E.5.

PASTRO.—786,465. Margarine, edible cooking fats and edible oils (for food). **Clyde Oil Extraction, Ltd.,** King George V Dock, Glasgow, S.W.1.

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Technical Press Review

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Dairy Engineering.—Outlook for Milk and Milk Products; Yugoslavia's Milk Powder Industry; Co-operative Butter Venture in Denmark; The Microscope for Dairy Chemists; Reporting the Dairy Show; Labour-saving Method of Making Cheddar Cheese.

Manufacturing Chemist.—Pumping: Chemical Pumps; Pumping Review; Use of Agar Films as Ultrafilters; Perfumes for Cosmetics—Suntan Preparations; Vitamin Products.

World Crops.—Preview of the Smithfield Show; Tropical Crops; Coffee in India; Weed Control in Sugar Cane; Crop Protection by Seed Treatment—2; The Machine in Tropical Agriculture—4; Paint in Tropical Climates.

Chemical and Process Engineering.—Electricity in Chemical Work: Electric Surface Heating for Surface Areas; Economical Electricity Generation in a Pharmaceutical Factory; Electric Furnaces in Chemical Manufacture; Size Reduction; Hypo from By-product Sulphite; Utilities and Services in the Chemical Industry; Atomic Energy: Swedish Heavy Water Process.

Paint Manufacture.—Guide to New Resins; Glycerol Alkyds have many Uses; J. S. Craig's New Paint Factory; Chemistry of Amino Resins.

For specimen copies write to Leonard Hill House, Eden Street, London, N.W.1.

New Companies

Bacon Packers, Ltd. (635638.) 37, Hanging Ditch, Manchester. £100. Dirs.: D. W. and J. A. Ostenfield.

G. Barraclough (Soft Drinks), Ltd. (636399.) To take over the bus. of soft drinks mnfrs. carried on at Inkerman Street, Cutler Heights Land, Dudley Hill, Bradford, as "G. Barraclough," etc. £25,000. Dirs.: Gladys, Bernard and Ronald Cawthray.

Food Manufacturers (G.B. Company), Ltd. (636458.) Barclays Bank Building, Hamilton Road, Trading Estate, Slough. £100. Dirs.: C. E. Pratt and E. L. Halliwell.

Frees King International, Ltd. (635861.) To carry on the bus. of mnfrs. of and dlrs. in ice cream freezers and refrigerating equipment and food storage or dispensing cabinets, etc. £100. Subs.: S. E. Q. Henriques and A. T. Bruce, 199, Piccadilly, London, W.1.

Gilbert Harris Exotic Food Co., Ltd. (635460.) Fitzjohns Road, Barby Road, Rugby. £300. Dirs.: G. M. and Patricia Harris and P. E. G. Stebbings.

Harris's Scotch Eggs, Ltd. (637076.) 5, St. John Street, London, E.C.1. To carry on the bus. of making Scotch eggs, etc. £100. Dirs.: Wm. J. and Hellen M. Harris.

Alfred Hunt (Sales), Ltd. (635190.) Shell House, London Road, Leicester. Mnfrs. of and dlrs. in bakers' and confectioners' machinery, etc. £100. Dirs.: Frances Cayless, A. W. Riddington and Wm. G. Hackett.

W. H. Luke and Son, Ltd. (636199.) The Quay, Oreston, nr. Plymouth. Mnfrs. of meat products, etc. £100. Dirs.: Wm. H., Mrs. Betty F. and D. W. Luke.

M. Millward, Ltd. (635068.) Upper Sutton Street, Aston, Birmingham. Retailers, wholesalers and mnfrs. of sugar confectionery and sweets, bakers, tobacconists, etc. £5,000. Dirs.: Mary and Wm. G. Millward.

Moorcrofts (Butchers), Ltd. (636212.) 15, Grafton Street, Altrincham. To take over the bus. of butchers and meat products mnfrs. carried on at 28, Regent Road, Altrincham, Ches., by L. J. and K. A. Moorcroft, etc. £1,000. Dirs.: L. J. and K. A. Moorcroft.

S.K. Refinery, Ltd. (636185.) 214, Bishopsgate, London, E.C.2. Refiners, packers and processors of foodstuffs, chemicals, etc. £100. Dirs.: J. E. Staines, A. J., and Mrs. Madge E. Keymer and Mrs. Gertrude M. Staines.

Scillonian Dairies, Ltd. (636866.) £5,000 Dirs.: Norman Christopher, Content St. Mary, Isles of Scilly, A. J. Gilmore, J. R. Hardern, Raymond MacLaran and W. R. Johns.

A. G. Skinner and Son, Ltd. (635686.) 48, Queen Street, Deal, Kent. To take over the bus. of bakers and confectioners carried on as "W. J. Cavell and Son" at Deal and Sandwich, etc. £5,000. Dirs.: A. G., Mrs. Joan M. and D. A. Skinner.

World's Finest Chocolate, Ltd. (638739.) 85, London Wall, London, E.C.2. £1,000. Subs.: Richard Millett and Angela R. Boschi, 85, London Wall, E.C.2.

These particulars of new companies recently registered have been extracted from the daily register of Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

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LODERS and NUCOLINE LTD.

INFORMATION BULLETIN

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UNSAPONIFIABLE MATTER

Definition : *The material present in an oil or fat, which remains non-volatile on drying to constant weight at 80°C, after the saponification of the oil or fat by alcoholic caustic potash and extraction by a specific solvent.*

Unsaponifiable Matter as defined above includes, among other things, hydrocarbons, higher alcohols and the sterols, cholesterol and phytosterol. The method of determination has been designed to exclude free fatty acids, soaps and mineral matter; readily volatile substances will be removed during the period of drying.

The majority of oils and fats have unsaponifiable contents below 2%, many have values below 1%. A few, however, have much higher values, up to 10%, and in these cases the normal method has been modified to avoid the formation of troublesome emulsions; Shea Nut Oil is a typical member of this group. With substances like wool fat (Lanolin) which contains a high proportion of wax esters, saponification is sometimes difficult to effect in one operation. In such instances the unsaponifiable matter is obtained in the normal way and then subjected to a further saponification with caustic alkali; re-extraction of the saponified product should then yield the unsaponifiable matter free from contamination.

As stated above the majority of oils and fats have low contents of unsaponifiable matter which consists mainly of sterols. It has been found that cholesterol is the sterol present in the unsaponifiable matter of animal oils and fats, whereas vegetable oils and fats contain phytosterol. If the acetates of these two sterols are prepared and melting points determined, it is found that cholesterol acetate has a much lower melting point than phytosterol acetate and this fact has been used to distinguish between animal and vegetable products.

IODINE VALUE

Definition : *A measure of the degree of unsaturation in oils and fats and denotes the percentage by weight of halogen, calculated as iodine, absorbed under standard conditions.*

Where the proportion of saturated acids is high, as in Coconut Oil and similar fats, Iodine Values are low, but with liquid oils the values are high and range from 80 to 200. Oils of the highest value, e.g. Linseed Oil, will absorb oxygen from the air and find use in surface coverings, but oils used for edible purposes have lower iodine values ; these run from 80—130, of which Groundnut Oil (85—95) and Cottonseed Oil (105—115) are the most common.

Iodine Values are useful in deciding purity, but their main function is in plant control of hydrogenation. As partial hydrogenation is usually carried out, determination of Iodine Value is very important, as the decrease in this value will indicate the degree of saturation attained.

Some oils, owing to the unusual chemical nature of their unsaturated acids, give Iodine Values by the normal method, which are lower than would be expected. Methods have been devised which give correct values, but these oils belong to the technical field and are not likely to be encountered when examining edible oils.

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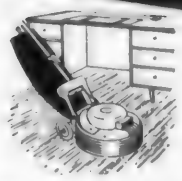

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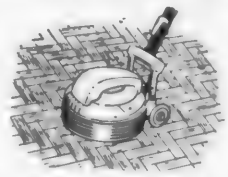

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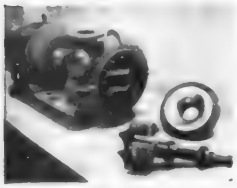

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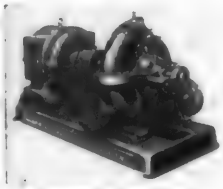

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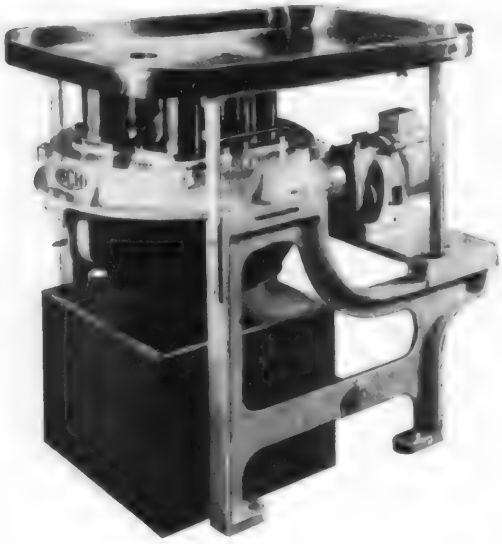

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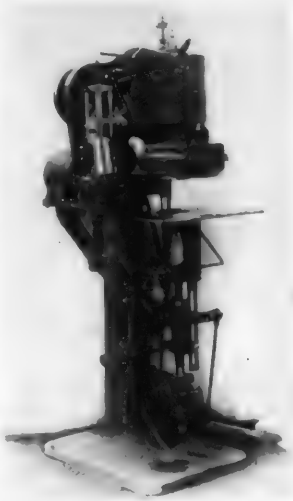

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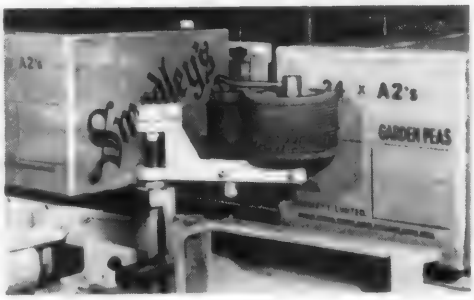

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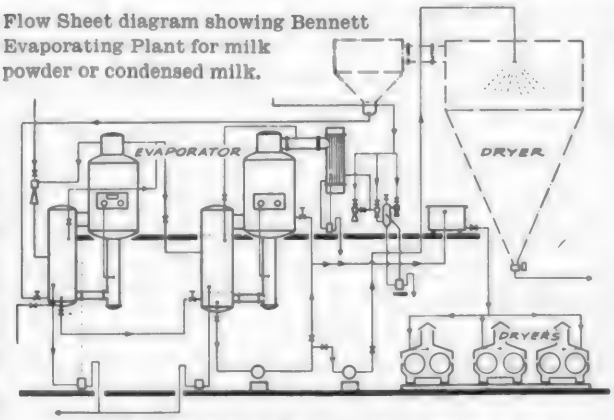

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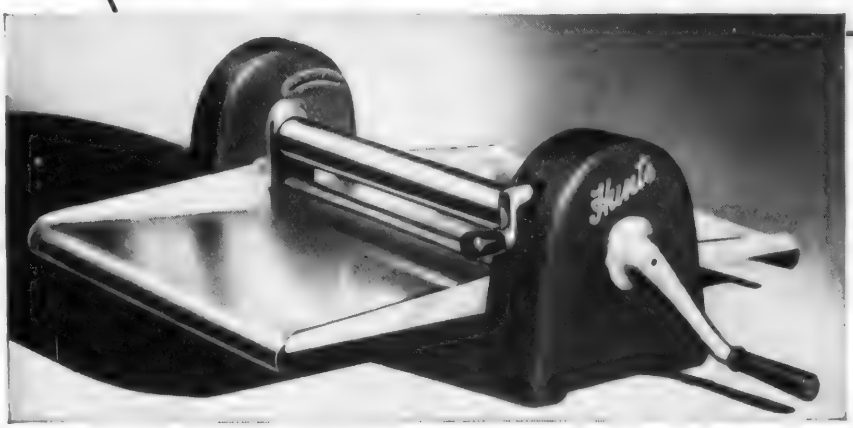

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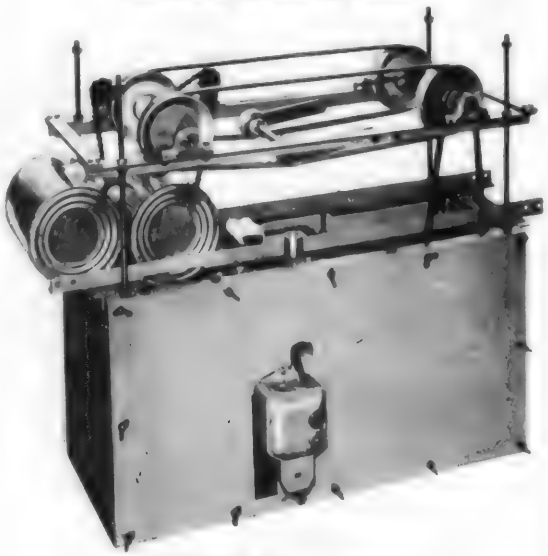

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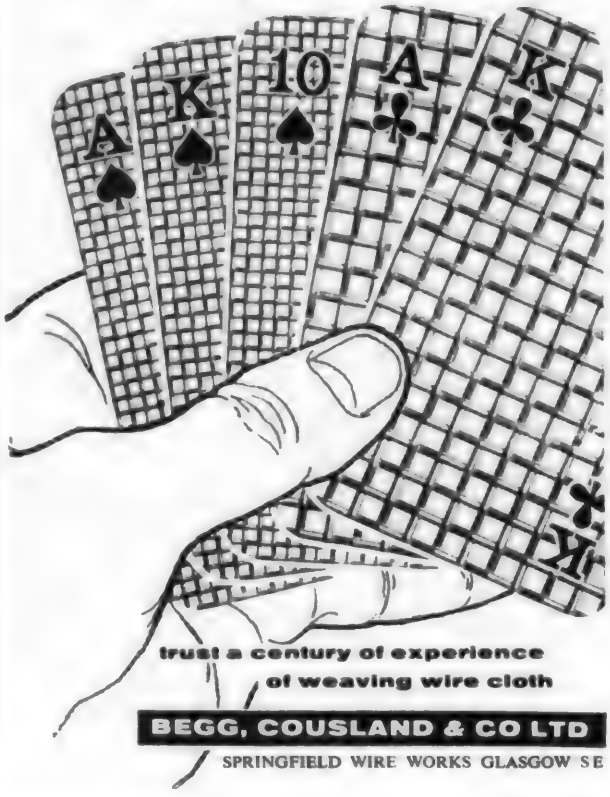

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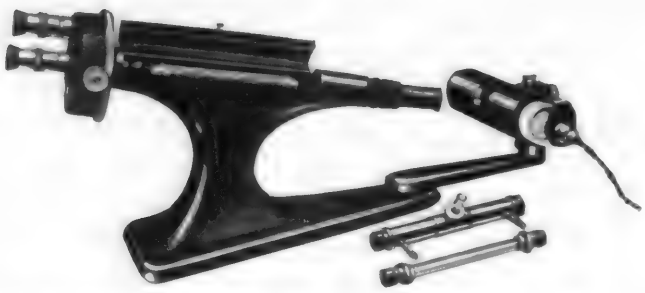

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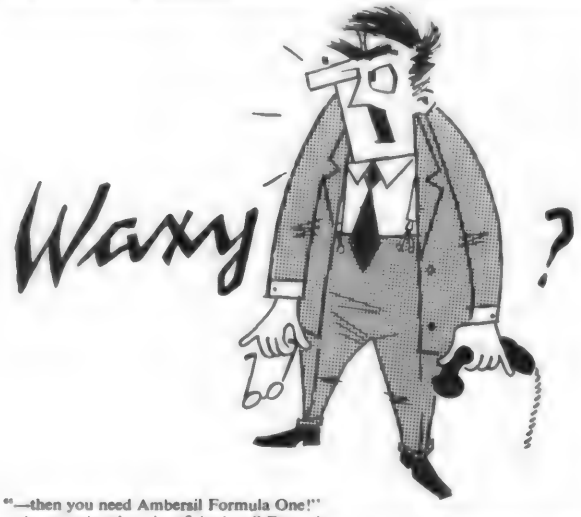

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FISH Trade organisation covering U.K. requires well educated young men between 20 and 26 to train as quality controllers. Experience in fish dressing and/or smoke-curing desirable. Commencing salary £500-£550 p.a. Pension scheme.—Box 918, Robertson and Scott, 42, Charlotte Square, Edinburgh.

CHEMIST with full knowledge in the manufacture of food and soft drinks wanted for Spain. Applicants should have full experience in food processing as well as plant manager.—Box B5902, *Food Manufacture*, Leonard Hill House, 9, Eden Street, London, N.W.1.

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Established company, highest rating and reputation in Canada.

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An interview will be arranged if background and potential from resumé meet requirements.

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Assistant Experimental Officer, holding Pass Degree or equivalent qualification in science, required for the Liaison Unit to work on problems connected with the manufacture of milk products. Salary scale £492 (age 21) to £670 (age 26 or over) to £855; pension scheme. Apply naming two referees to Secretary, N.I.R.D., Shinfield, Reading. Quote ref. 59/6.

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THE MANAGER

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I.S.I.S. Appointments Register

Licensed annually by the L.C.C.

9, Eden Street, London, N.W.1. EUSton 5911.

I.S.I.S. is an organisation backed by a large industrial group of consultants with contacts in all the industries based on technology. As an addition to their present resources they have established this Appointments Register. Below will be found some of those technologists who are looking for further opportunities. Employers and Personnel Officers are invited to complete the form below, detach and send to the above address. In this particular instance the use of a form, with its attendant simplification of office systems, ensures speedier results for the employer.

Ref. A.62. Swiss. Male. Age 22. Qualified Switzerland as Laborant (Assistant Chemist). 5 years experience as Assistant Chemist with Swiss Chemical Manufacturers. Resident London during last 6 months perfecting his fluent English. He is now seeking a permanent post either in U.K., France or U.S.A. as a Technical Representative, where his scientific background and fluent German, French and English could be best utilised. Would also be interested in hearing of appointment which included technical translation work and abstraction of technical information. Also interested to hear of appointment in research work, possibly in dyestuff department of chemical manufacturers.

Ref. A.64. British. Male. Age 48. Married. Experience: 3 years Senior Mineral Boring Engineer. 8 years Drilling Manager. 2 years Drilling Supervisor. 8½ years Driller Supervisor Petroleum Company. 3 years Trainee with Petroleum Company. Now seeking permanent position U.K. or abroad as Drilling Manager.

Ref. A.65. British. Male. Married. B.Sc.(Eng.) Diploma Civil Engineering. A.M.I.C.E., M.E.I.C. Experience: 2 years Civil Engineering Assistant airfield construction. 2 years Assistant Road Engineer. 2 years Chief Design Engineer. 2 years Designing Engineer. 3½ years Superintendent of Lights Government of Canada. Approximately 7 years of career has been in Roads and Highways—materials, traffic, resident engineer, design engineer, etc. Responsible 7 million dollars worth of construction work annually on major highways—Canada. Last 3 years has held responsible senior position concerned with aids to navigation and other marine work. Is now seeking a permanent Senior Appointment in Civil Engineering —roads, general construction or administration—in London.

Ref. A.66. British. Male. Age 36. Married. A.M.I.E.D. 4 years apprentice with aircraft accessories Company. 5 years Design Draughtsman with same Company. 1 year Design Draughtsman gas control equipment. Design Engineer with Industrial Consulting Company. 3 years Self-Employed as Industrial Consultant. Experienced in all types of mechanical Design and in control of a mixed drawing office. Security cleared. Now seeks permanent appointment London area as Chief Draughtsman or Assistant Chief Draughtsman. Considers prospects more important than salary suggests commencing salary of £1,200 per annum.

Ref. A.68. British. Male. Age 31. B.Sc.(Eng.). Mechanical Engineering 9 years with Aircraft and Guided Weapon Contractor as Assistant Project Engineer. Has undertaken Free Lance Consulting work—Chemical Engineering. Ran own business for 2 years manufacturing water filters. Now seeking appointment in Technical Management, Pure Research or Technical Sales in U.K., preferably London or West Home Counties, but would consider elsewhere. Would be interested in trainee scheme for technical management of sales. Salary required £1,200 p.a.

Ref. A.70. Irish. Male. Recent Graduate, Dublin. Chemical Engineering. Now seeking post U.K. or abroad as Chemical Engineer with salary of £700 p.a.

Ref. A.71. Irish. Male. Age 23. Just graduated B.E. (Chemical) degree. Dublin. At present studying Economics and Costing Methods in spare time. Now seeking permanent appointment U.K. or abroad as Chemical Engineer—process development or production. Salary £700.

Ref. A.72. Australian. Male. Age 30. Single. Production Engineering Diploma. Grad.I.Prod.E. At present tool and production engineer. Previous experience: 1 year Planning Engineer telecommunications. 1 year Design Draughtsman—domestic appliances. 2 years Methods Engineer Mechanised Rubber Goods. 2½ years Production Plan and Control Trainee—electro-mechanical products. 3 years Precision Engineer Apprenticeship. Has worked U.S.A. and Australia. Now wishes to settle permanently in Britain and requires post as Production Engineer, London area.

Ref. A.76. British. Male. Age 56. Married. Graduated Electrical Engineer. Graduated Electronic Engineer. 2 years Lecturer at University—tutorial and laboratory classes. 7 years sound recordist—film factory. 1 year Electronic Engineer audio laboratory. 2½ years Senior Engineer—electronics. 3½ years Senior Designer. Post graduate courses in Pulse Technique. Seeks post as Senior Research Engineer, Middlesex or London, £1,400 p.a.

Ref. A.77. British. Male. Age 25. Married. Second Year National Aero Engineering Cert. At present employed Electrical Design—aircraft industry. Previous Experience includes 8 months jig and tool draughtsman and 3 years R.A.F. Engine Turbine Fitter. In present post has carried out extensive liaison work and has been Instructor (L.C.C. evening classes) on aero engines. Now seeks post London or Home Counties as Technical Representative. Salary £900 p.a.

Ref. A.78. British. Male. Age 49. Single. Experience: 18 years Designer with Exhibition contractors. 6 years Draughtsman, Ministry of Supply. 6 years Patner Exhibition Contractors. 2 years Draughtsman Tyre and rubber manufacturers. Seeks appointment in Surrey with salary of £1,000-£1,250 p.a.

Ref. A.79. British. Male. Age 40. Married. F.R.I.C., B.Sc.(Spec.) Chemistry and Mathematics. Experience includes 4 years Assistant Plant Manager —Soaps, Detergents, Chemicals and Edible Oils. 2 years Plant Manager Soap, Detergents, Chemicals and Edible Oils. 4 years same field as Technical Director Africa. 2 years same industry Development Manager India. Now seeking senior appointment with excellent prospects requiring technical skill and experience. Salary £3,000 p.a.

Ref. A80. British. Male. Age 53. 5 years Marine Engineering Apprenticeship. 5 years 6th, 5th, 4th Engineer Tanker Company. 2 years Structural Engineer Oil Company. 2 years Structural and Installation Engineer Colliery. 2 years Structural and Installation Engineer Scottish Company. 4 years Structural and Works Foreman, petroleum company. 5 years War Service in Merchant Navy as Salvage Engineer. 1 year Production Engineer dynamo company. 2 years Field Engineer and 2 years Resident Engineer Oil Company in East Africa. 4 years Design and Development Engineer Sudan. 2 years Field Engineer petroleum company, Pakistan. Inventory of a Cotton "Stalk Pulling Machine". Now seeking a post as Fields or Works Engineer preferably U.K. but would consider abroad. Salary £1,200-£1,500.

Ref. A.81. British. Male. Age 37. Married. Educated to H.N.C. Standard. Associate Member Institute Materials Handling. Experience: including 12 years Chief Draughtsman—Mechanical Handling. 1 year as Executive Engineer with consultants. Is experienced in all forms of materials handling and mechanical handling equipment, both for bulk and package handling, covering complete X range from foundry plants to food handling equipments. Knowledge of Technical Sales. At present Assistant General Manager with Mechanical Handling Company. Now seeking Executive Post in Materials Handling. London area. Salary £1,500.

Ref. A.82. British. Male. Age 30. Married. Final diplomas Institute City & Guilds Chemistry, Bacteriology, Production and Processing Milk and Milk Production. Experience 6 months Factory Manager—dairying. 4½ years Factory Manager, large processing dairy. 32 years Dairy Inspector with Dairying Group. Has attended Management School for Senior Executives and Managers, Natal University. Currently studying for C.I.S. Has wide general food technological interest; keen on production, processing, etc. Now seeking a management appointment overseas, except S. or E. Africa, or U.K. (Provinces), with U.K. salary of £1,000 p.a., would also be interested to join management trainee scheme.

[Continued overleaf

To: I.S.I.S. Appointments Register, 9, Eden Street, London, N.W.1. Please ask the following applicants to communicate with the undersigned:

Ref.:.....	**Ref.:**.....	**Ref.:**.....	**Ref.:**.....
Ref.:.....	**Ref.:**.....	**Ref.:**.....	**Ref.:**.....
Ref.:.....	**Ref.:**.....	**Ref.:**.....	**Ref.:**.....

Please use Block capitals

Name: .....

Position: .....

Company: .....

Business or Profession: .....

Address: .....

All introductions are made on the understanding that should an engagement result the employer agrees to I.S.I.S. Appointments Register's terms, which are as follows:

For each person engaged the equivalent of one weeks salary payable by the employer within fourteen days of the date of engagement.

Signature..... Date.....

I.S.I.S. APPOINTMENTS REGISTER (Continued from overleaf)

Ref. A.83. British. Male. Age 39. Married. Associate Member of Institute of Industrial Technicians. Member of the British Ceramin Society. Member of Institute of Clay Technology. 2 years Management Course. At present employment in Atomic Research (ceramics). Experience: 6 years Ceramics Engineer sparking plug manufacturers. 17 years with crucible manufacturers. Ceramics trainee, foreman. Senior Work Study Engineer. Now seeking appointment on Management Staff in Ceramics Industry, or other processing industry, in Home Counties or South or South West England. Salary £1,500 p.m.

Ref. A.84. British. Male. Age 41. Married. Mechanical Engineer up to N.H.C. 7 years Apprentice—aircraft. 2 years Charge Hand—aircraft. 3 years Works Superintendent Heavy Diesel Engine Manufacture. 4 years Section Leader over production development. 2 years Works Manager, machine tools. 2½ years Works Manager general engineering. At present General Manager, special purpose machine design. Seeks appointment U.K. or abroad. Salary £1,500 min.

Ref. A.85. British. Male. Age 26. Married. O.N.C., 2nd Class M.O.T. Cert. (Motor). 5 years 10 months General Apprentice Pattern Shop. Foundry and Drawing Office. At present 2nd Engineer Officer in charge of all engine room personnel. Seeks Technical/Supervisory appointment. Anywhere except Middle East. Salary £1,000.

Ref. A.86. British. Male. Age 30. O.N.C. (Mechanical), H.N.C. (Production) Production Control Course, A.M.I.Mech.E., Grad.I.Prod.E. 6 years Apprenticeship Mechanical and General Engineers. 7 months Mechanical Draughtsman Mechanical and General Engineers. 6 months Production Design Draughtsman, electrical mechanical engineers. 6 years Senior Factory Planning Engineer, responsible for planning, work study, rate fixing, methods, etc., with aero and marine engine manufacturers. Seeks post as Assistant Works Manager London or Home Counties or Southern England. Salary £1,300.

Ref. A.87. British. Male. Age 28. Married. Ministry of Transport 1st Class Cert. Marine Engineering (Steam)., A.M.I.Mar.E. to be applied for. At present studying for National Certificate in Electrotechnology final year. Experience: 2 years 4th Engineer. 5 years 3rd Engineer. 5 years Apprentice Fitter-Turner Rayon manufacturer. Seeks appointment U.K. in General Engineering. Salary £850 p.a.

Ref. A.88. British. Male. Age 24. Single. G.C.E. A level Chemistry, Physics, Pure and Applied Mathematics and 1 year full-time Imperial College of Science. Experience: 5 months Bench Assembler—motor component manufacturers. 6 months Mechanic—motor repair work. 1 year Laboratory Assistant Chemical Drying Equipment. 1½ years as Sales Representative. Health excellent. Current driving licence. Seeks post U.K. or abroad as Technical Representative. Salary £750 p.a. or is prepared to study or train with a firm offering a good career through its technical sales department.

Ref. A.89. British. Male. Age 38. Married. S.C. and H.N.C. (Electrical)., Associate Member of Institute of Technology. 4 years Tester Electrical Manufacturers. 6 years Engineer in charge laboratory Divisional H.Q. British Electricity Authority. 4 years Development Engineer Meter, Relay and Instrument Manufacturer. 3 years Senior Assistant Engineer Design and Development and Production Electricity Meter and Instrument Manufacturer. Seeks appointment as Design, development or test engineer with manufacturers in London. Salary £1,150-£1,200 p.a.

Ref. A.90. British. Male. Age 43. Married. 6 years apprenticeship aircraft manufacturers. 5 years M/C Shop Foreman—carburettor manufacturers. 1 year Area Inspector Civil Service (Marine). 7 years Works foreman—general engineering. 3 months Works Manager Aircraft Engineers. 6 years M/C shop foreman aircraft and marine engineers. Seeks post as Machine Shop Foreman/Superintendent, Northern England, Lancashire preferred. £850-£1,000 p.a.

Ref. A.91. British. Male. Age 33. Married. O.N.C. (Electrical) level. 5 years Apprentice electrical company. 4 years Draughtsman electrical company. 3 years Draughtsman, 1 year checker and at present service engineer with Furnace manufacturers. Used to handling skilled labour. Completed installations abroad. Seeks post London or Provinces as Assistant Plant Engineer or Assistant Works Engineer, etc. Salary £1,000 p.a.

Ref. A.93. British. Male. Age 32. Married. Higher School Cert. Chemistry and Physics. Has reached B.Sc. standard in Chemistry by part-time study. Experience: 2 years Radar Mechanic. 2 years Laboratory Assistant with linoleum and rubber manufacturers. 4½ years Assistant Plant Manager with company manufacturing agricultural chemicals. 2½ years Assistant Works Manager with chemical manufacturers. 2 years as Plant Manager with chemical manufacturers. Seeks appointment London or Provinces as Production/Works Manager. Salary £1,500.

Ref. A.94. British. Male. Age 37. Married. Experience: 5 years apprentice fitter and turner, Admiralty. 4 years Shift charge engineer (power stations). Admiralty. 1½ years Draughtsman Engineering Company. 3 years Design Draughtsman—hydraulic engines. 8 years General Manager—mechanical engineers. At present Assistant Engineer with Consulting Mechanical Engineers. Seeks appointment as Technical Representative or Works Manager. U.K. Salary £800 p.a.

Ref. A.95. German. Male. 45. Mechanical Engineer Certificate. Skilled locksmith with experience in engine repair, and electric arc welding. Experience: 7 years as Locksmith. 6 years Engineer. 2 years Engine Service. 3 years Service and Sales experience in automobile fabrication. Seeks appointment U.K. or West or East Africa or Middle East as Mechanical Engineer, willing to begin as locksmith.

Ref. A.96. British. Male. Age 44. A.M.I.Mech.E. Experience: 8 years as apprentice and Junior section leader with engineering Company. 4 years Army as Electrical and Mechanical Engineer. 3 years Design Engineer. 6 years Chief Designer with manufacturing engineers of contractors plant and general mechanical/structural products. Seeks post U.K.—Midlands preferred, as Chief Engineer/Chief Designer. Salary £1,750-£2,000.

Ref. A.97. British. Male. Age 37. Married. A.M.I.Mech.E. 2½ years apprentice and fitter turner. 3½ years Jig and Tool Draughtsman—car body engineers. 1½ years Mechanical Draughtsman with general engineers. 3 years Senior Draughtsman with Mechanical Handling Engineers. 2 years Materials Handling Engineer with general engineers. 2 years Chief Contract Engineer with materials/mechanical handling engineers. Seeks appointment London area as Technical/Contract/Sales Engineer preferably in materials/mechanical handling. Salary £1,300.

Ref. A.98. British. Male. Age 26. Single. A level G.C.E. Physics, Pure Mathematics, Applied Mathematics and Chemistry. City & Guilds (Intermediate) Instrument Maintenance. Experience: 4 years Technical Commission R.A.F. 2 years Development Assistant with Instrument Company. Seeking appointment in the instrument field (not electronics) where opportunity will be given to develop knowledge of Instrumentation on broader lines and encouragement for continued study. Salary £750 p.a.

Ref. A.99 British. Male. Age 22. Higher National Diploma in Mechanical Engineering. Experience: 6 months Fitter and Turner. 6 months Draughtsman and 6 months assisted site engineers with steel manufacturers. Seeks permanent appointment as Plant or Development Engineer. U.K.—preferably London. Salary £700-£750.

Ref. A.100. British. Male. Age 24. Single. B.Sc. (Chemistry). Prior to H.M. Forces spent 2 months as Technical Sales Assistant with paper and plastics Engineers. Since joining Army has undergone course in Electronics and is now an Instructor in Radar and works on Radar Inspection team. Seeks post in Technical Sales or Liaison in Italy. Salary £700 p.a.

Ref. A.101. British. Male. Age 36. A.M.I.E.E., B.Sc., H.Nat.Cert.Elec. 1½ years apprentice Engineering Company. 2 years Technical Assistant Electrical Rolling Stock—railway. 2½ years Technical Sales. 9 years Electrical and Instrument Engineering with Chemical and Metals manufacturer. Seeks appointment Technical Sales or Works Engineer or electrical or Chief Engineer. London area. Salary £1,750 p.a.

Ref. A.102. British. Male. Age 31. R.E., R.E.A., H.E.C.(Royal Navy) N.A. 1 year Radio Telemetry Engineer. 13 years Radio Electrical Artificer Admiralty. Seeks post in Electron Beam Generating, U.K. or Japan. U.K. salary £1,500.

Ref. A.103. British. Male. Age 24. Married. Grad.I.Prod.E. 5 years General Engineering Student Apprentice. 7 months Estimator Draughtsman steel fabricators. 2 years Trade Test Board H.M. Forces. 7 months Engineer with welding engineers, plastic chemical plant manufacturers. At present Production Manager Sub-Contract Aircraft Engineers. Seeking permanent appointment London or Southern Counties as Training Office—Production Management. Salary £850 p.a.

Ref. A.104. British. Male. Age 34. Married. O.N.C. standard (technical chemistry). 4 years works apprentice—coal (tar by-products). 10 years Oil (petroleum refining) as Process supervisor and Refinery area supervisor. 3 months commissioning engineer manufacturers of process plant. Seeks appointment Supervision of chemical plant anywhere except Middle East or Africa. Salary £1,400.

Ref. A.105. British. Male. Age 39. Married. Experience: 7 years Laboratory Technician with Research Laboratories. 4 years Senior Inspector—radar and general electronics. 1 year Chief Inspector precision engineers. 3 years Chief Inspector. 1 year Senior Mechanical Inspector Electronic Instruments. Seeks post as Chief Mechanical Inspector or Technical Representative, U.K. preferably London area. Salary £900 p.a.

Ref. A.106. British. Male. Married. Age 29. O.N.C. Electrical, C. & G. Institute Electrical "B" Certificate. 2½ years Apprentice Electrical Engineer, electrical assembly and repair. 2½ years Apprentice Electrician—factory maintenance—tin box and steel drum manufacturers. 1½ years Seagoing Chief Electrician. 6 years Seagoing and Staff Electrician. Seeking an appointment in Electrical Engineering, preferably Merseyside, but would consider post anywhere if prospects were sufficient, would be prepared to take training course in new field if necessary. Salary £900 p.a.

Ref. A.107. British. Male. Age 40. Married. B.Eng. Mechanical electrical., B.Sc. applied technology, M.Eng.A.M.I.Mech.E. Experience: 1 year works engineer, textile plant, Ireland. 2½ years Maintenance development engineer Chemical Manufacturers U.S.A. 2 years Lecturers, University and Technical. 1 year Manager, director, chemical manufacturing company India. 1 year Assistant Professor Engineering drawing University U.S.A. 2 years Senior staff engineer Maintenance Chemical Manufacturers U.S.A. Seeking appointment as Manager, Development or Maintenance Engineer in the chemical or other industries, preferably Far East. Salary £2,500.

Ref. A.108. British. Male. Age 34. Single. Professional qualifications equivalent A.M.I.Mech.E. Works experience—all branches of design and development in the light/medium engineering field, For last 7 years various executive engineering. managerial appointments—Production Control, Works and Office Management, Sales and Market Research. Now seeking progressive appointment as General Manager, Works Manager, Technical Director or similar. Salary £2,000 p.a. minimum.

Ref. A.109. British. Male. Age 26. Married. Intermediate B.Sc., Part 1 B.Sc. 3 years Assistant Chemist Preserve and Confectionery Manufacturers. 5 years Laboratory Assistant (antibiotic research). At present Assistant Chemist with fine couverture and chocolate manufacturers. Seeks appointment London or Home Counties preferred, as Production Manager, salary £800 p.a., or Trainee Production Manager, preferably food industry.

Ref. A.110. British. Male. Age 30. G.I.Mech.E., Grad.I.Prod.E. Mechanical Engineering Apprenticeship followed by 3 years in workshops as fitter, then Experimental Mechanics. 2½ years as Technical Assistant on Production Development with Electric cable makers. Seeking appointment London, Kent, South England, Production Management, Engineering Development or Production. Salary £950 p.a.

Ref. A.111. Danish. Male. Age 24. Single. M.Sc. from Danish Technical High School. 2½ months as technical assistant, glassworks—France. 1½ years Chemist—brewery. 1 year Chemist—feeding stuff laboratory. Seeking appointment U.K., South America or Far East as chemical engineer. Salary £900-£1,200.

Ref. A.112. British. Male. Age 31. Single. G.C.E. A level Chemistry, Pure and Applied Mathematics. Also passed mathematics paper B.Sc. General Examination. 1 year technical clerk—brewers. 5 years analyst in metallurgical work. 2 years radio and electronics. 7 months analyst—pharmaceutical chemists. Seeks post in London in chemistry or electronic laboratory work. Salary £700-£800.

Ref. A.114. British. Male. Age 28. B.Sc. Mech. Eng. Experience: 1 year teaching Mathematics. 2 years Maintenance Engineer food manufacturers. 14 months Service Engineer Food Machinery manufacturers. Seeks appointment as Construction and Maintenance Engineer. Salary £900.

Ref. A.115. Polish. Male. Age 40. Chemical Engineer 1 year Control of Laboratory Production photochemical materials. 1 year in charge Chemical Department Import-Export firm. 3 years Deputy Director Department of cellular concrete, head of department of mechanical equipment, head of department of technology with Institute. 1 year head of design office of Building Materials Plant. 2 years research technologist housing institute. 1 year head of department of building materials, light industry institute. 2 years in charge pilot plant—research and development organisation. Seeks appointment London or Europe, except Germany or Eastern Europe. Salary £1,500 minimum.

Ref. A.116. British. Male. Married. Age 36. H.N.C. Mechanical Engineering., Associate Member of the Institution of Engineering Designers. 4½ years Experience: 4½ years general engineering apprenticeship. 1 year Draughtsman armaments and vehicle chassis manufacturer. 2 years Draughtsman, precision tool and machine designers. 2 years Draughtsman, marine ventilation engineers and fan makers. 6 years Design Draughtsman, pneumatic drying plant designers and suppliers. Seeks post as Mechanical Engineer, salary £1,050-£1,250 p.a.

Ref. A.117. British. Male. Age 23. Married. Mechanical Engineer. 4 years Apprentice marine engineers. 2 years Apprentice and Journeyman, Mechanical Engineers (Mining). At present engaged in work study R.A.F. Now seeking appointment in Work Study or as a Technical Sales Representative. Salary £600.

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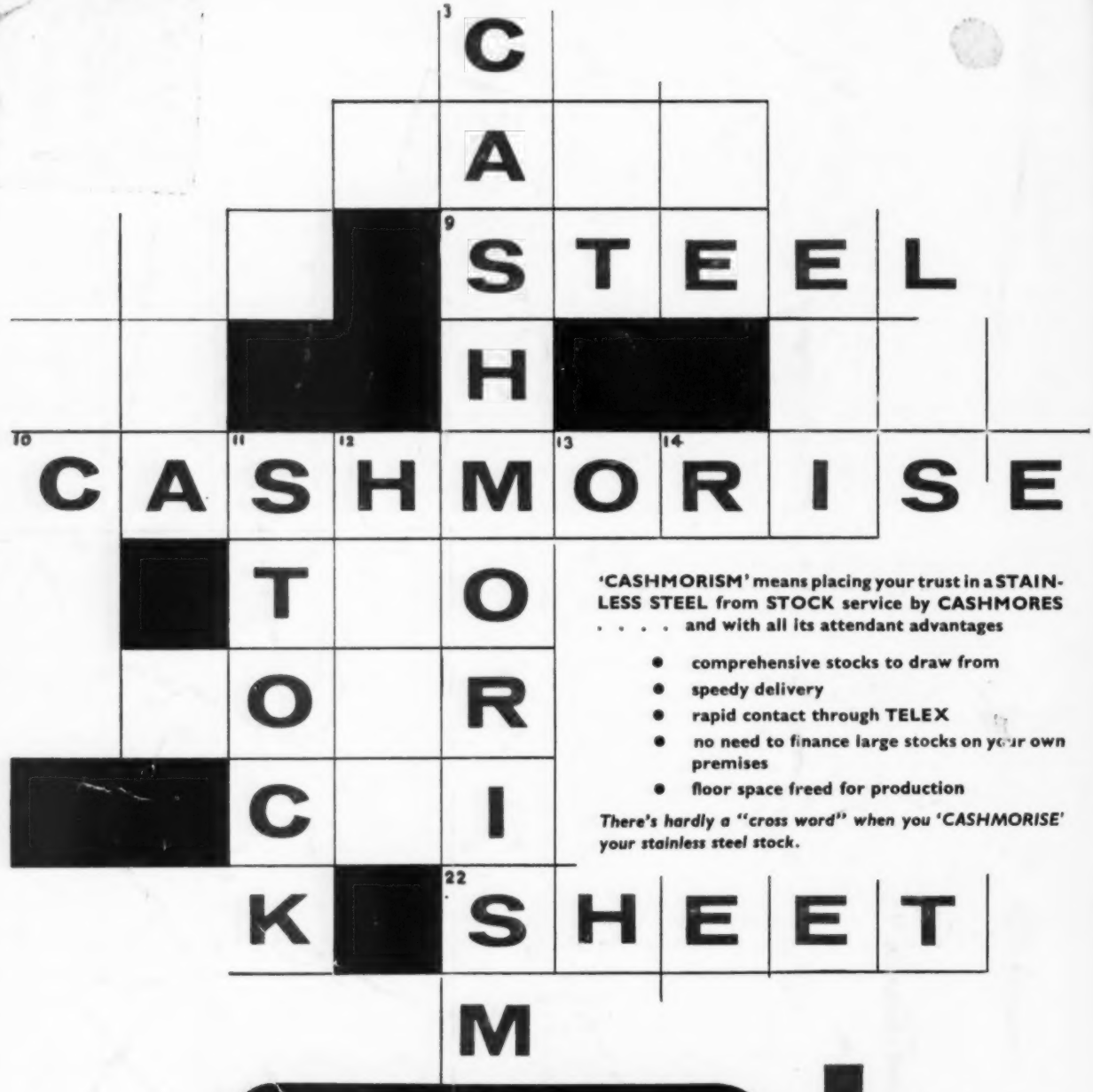

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